URS

March 24, 2006

Mr. Danny Domingo
California Environmental Protection Agency
Department of Toxic Substances Control
Northern California Region
1515 Tollhouse Road
Clovis, California 93611

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RE: Contract No. 02-T2555
Work Order No. 1-555-1.0-101534
Draft Removal Action Work Plan
Osage Industries Site, Rosamond, California

Dear Mr. Domingo:

In accordance with this Work Order, URS Corporation Americas (URS) has enclosed one copy of the Draft Removal Action Work Plan for the Osage Industries site in Rosamond, California. Per your instruction, another copy of this report is being sent to Rosamond Public Library located on 3611 W. Rosamond Blvd., Rosamond, California. Should you have any questions or require additional information, please call me at (916) 679-2398.

Sincerely,
URS Corporation Americas

Amir Kh. Matin

Amir Matin, R.G., C.E.G., C.H.G.
Project Manager

AM:rrd

Enclosure

URS Corporation
Crown Corporate Center
2870 Gateway Oaks Drive, Suite 150
Sacramento, CA 95833
Tel: 916.679.2000
Fax: 916.679.2900

17325502.00060

DRAFT

REMOVAL ACTION WORK PLAN
OSAGE INDUSTRIES SITE
ROSAMOND, CALIFORNIA

Prepared for:

Contract No. 02-T2555
Work Order No. 1-555-1.0-101534
Department of Toxic Substances Control
Northern California Region
1515 Tollhouse Road
Clovis, California 93611

Prepared by:

URS
URS Corporation Americas
2870 Gateway Oaks Drive, Suite 150
Sacramento, California 95833

March 2006

IDENTIFICATION/APPROVAL FORM

Document Title: **REMOVAL ACTION WORK PLAN OSAGE INDUSTRIES SITE**

Organization Title: URS Corporation Americas
Address: 2870 Gateway Oaks Drive, Suite 300
Sacramento, California 95833

Prepared By:
Amir Matin, R.G.
Tarek Gaylon
Richard Moore, C.I.H.
Venus Sadeghi, Ph.D.

Project Manager:
Amir Matin, R.G.
(916) 679-2398

Report Coverage: This constitutes the Removal Action Work Plan for technical support at the Osage Industries site as a part of the program under Contract No. 02-T2555 for the Department of Toxic Substances Control. These services are provided by URS Corporation Americas as prime contractor.

Approved by:

Signature: Amir R. Matin
Name: Amir Matin, R.G.
Title: Project Manager
URS Corporation Americas

Date: March 24, 2006

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ABBREVIATIONS AND ACRONYMS

ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
CAA	Clean Air Act
CAM	California Assessment Manual
CARB	California Public Health Air Resources Board
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH&S	California Health and Safety Code
CNR	California Natural Resources
COC	contaminant of concern
COPC	contaminant of potential concern
CRDL	contract-required detection limit
CRZ	contamination reduction zone
CWA	Clean Water Act
cy	cubic yard
DOT	Department of Transportation
DQO	data quality objective
DS	dark stained
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
EPC	exposure point concentration
ESA	Endangered Species Act
EZ	exclusion zone
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GRA	general response action
HASP	health and safety plan
HI	hazard index
HMTA	Hazardous Material Transportation Act
HQ	hazard quotient
HRA	human health risk assessment
HSWA	Hazardous and Solid Waste Amendments
kg	kilogram

ABBREVIATIONS AND ACRONYMS (Continued)

MCL	maximum contaminant level
MCLG	maximum contaminant level goal
mg/kg	milligram per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
MPRSA	Marine Protection, Research, and Sanctuaries Act
NCP	National Contingency Plan
NHPA	National Historic Preservation Act
OCDD	octachlorodibenzo-p-dioxin
OEHHA	Office of Environmental Health Hazard Assessment
O&M	operation and maintenance
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PCDD	polychlorinated dibenzo-p-dioxins
PCDF	polychlorinated dibenzofurans
PCB	polychlorinated biphenyl
pg/g	picograms per gram
PMCL	primary maximum contaminant level
PRG	preliminary remediation goal
QA	quality assessment
QAPP	quality assurance project plan
QC	quality control
RA	removal action
RAO	removal action objective
RAWP	removal action work plan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RWQCB	California Regional Water Quality Control Board
SARA	Superfund Amendment and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
SI	site investigation
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
STLC	soluble threshold limit concentration
SWPPP	stormwater pollution prevention plan
SZ	support zone
TBC	to be considered
TCDD	tetrachlorodibenzo-p-dioxin

ABBREVIATIONS AND ACRONYMS (Continued)

TCDF	tetrachlorodibenzo-p-furan
TCLP	toxicity characteristic leaching procedure
TEF	toxicity equivalency factor
TEQ	toxicity equivalent
TPH-d	total petroleum hydrocarbons as diesel
TTLC	total threshold limit concentration
UCL	upper confidence limit
URS	URS Corporation Americas
USA	Underground Service Alert
VOC	volatile organic compound
WET	waste extraction test
WHO	World Health Organization
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µg/dl	micrograms per deciliter

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EXECUTIVE SUMMARY

Pursuant to Work Order No. 1-555-1.0-101534 issued under Contract No. 02-T2555, the California Department of Toxic Substances Control (DTSC) has retained URS Corporation Americas (URS) to prepare a removal action work plan (RAWP) for removing contaminated soil at the former Osage Industries site (site) at 60th Avenue West in Rosamond, California. This RAWP includes:

- A summary of the activities performed and the data collected in support of the remedial investigation (RI) at this site, including characterization of impacts to soil and groundwater;
- A recap of the human health risk assessment (HRA) performed in support of the RI report (URS, 2005);
- A description of the applicable or relevant and appropriate requirements (ARARs);
- A discussion of the removal action objective (RAOs);
- A detailed evaluation of removal action alternatives supportive of the RAOs for the site; and
- A discussion of the various components required to implement the removal action.

Historically, the site was used to store and mill ore containing base and precious metals and to recover scrap metals. These processes involved the use of hazardous chemicals, such as nitric acid and cyanide. Residual ash and slag piles in the southern portion of the site indicate that the processed ore was smelted in the furnace that remains at the site. Results of previous investigations of the site revealed various contaminants of concern (COCs), including heavy metals and dioxin contamination at three times background levels, with total arsenic, total beryllium, and dioxin exceeding cancer risk screening concentrations.

The RI performed by URS in 2004 and 2005 reported metals and dioxins in site soils at concentrations requiring remediation under the industrial land-use scenario used in the risk assessment. These results indicated that two areas, the ash piles to the south of the fenced area and the drummed ash, required immediate attention and debris removal. About 25 cubic yards (cy) of waste were containerized and disposed of at an off-site facility in December 2004.

A cultural resources Records Search was conducted in March of 2006 by the Southern San Joaquin Valley Information Center under contract to the State Office of Historical Preservation. It was determined that there are no recorded cultural resources within the project/site area. However, there are 11 recorded cultural resources within a half mile radius and 8 within a one-mile radius of the site.

The RAOs for this site were chosen based on land use, site ownership, and the concentrations of the COCs. This RAWP delineates the appropriate removal action for other waste materials and impacted soil remaining on site after the initial removal of 25 cy of debris. Two alternatives were retained after the initial technology screening:

- The "no action" alternative; and
- Land-use controls/excavation/removal/off-site disposal.

These alternatives were further evaluated using the United States Environmental Protection Agency (EPA) and DTSC guidance criteria of effectiveness, implementability, and cost. The preferred alternative is removal of 92 cy of soil and the transfer and disposal of that soil at an off-site landfill. The estimated cost is approximately $108,000. The primary COCs on site are arsenic, cadmium, lead, and dioxins/furans. The RAOs and cleanup goals for the site were selected based on a 1 in 100,000 cancer risk level for these risk driver constituents under an industrial land-use scenario. The site is owned by a third party, and the land use is expected to remain industrial for the foreseeable future; therefore, this level of cleanup was determined to be appropriate to safeguard public health and the environment.

1.0 INTRODUCTION

Pursuant to Work Order No. 1-555-1.0-101534 issued under Contract No. 02-T2555, the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) has retained URS Corporation Americas (URS) to prepare a removal action work plan (RAWP) for removing contaminated soil at the former Osage Industries property (site). The site is located at 60th Avenue West in Rosamond, California, within Kern County (Figure 1-1).

Historically, the site was used to store and mill ore containing base and precious metals and to recover scrap metals. These processes involved the use of hazardous chemicals, such as nitric acid and cyanide. Liquids generated during these processes were collected in surface impoundments or ponds. Residual ash and slag piles in the southern portion of the site indicate that the processed ore was smelted in the furnace that remains at the site.

Previous site investigations determined that on-site soils contained site-related contaminants, including various metals, polychlorinated biphenyls (PCBs) (Arochlor®-1254), and polychlorinated dioxins and furans (dioxins). Low concentrations of several volatile organic compounds (VOCs) also were reported. Arsenic and cyanide were reported in groundwater samples collected from the site. A remedial investigation (RI) was performed by URS between January 2004 and June 2005 (URS, 2005). The following RI activities were completed:

- Soil investigation;
- On-site residential well water characterization;
- Background soil characterization;
- Ash disposal activities; and
- Health risk assessment (HRA).

The RAWP objectives are to evaluate appropriate cost-effective removal action alternatives in support of the removal action objectives (RAOs) and to delineate the various components necessary to implement the removal action. The RI findings and the results of the HRA were used to develop the RAOs and cleanup goals for the site. The RAOs were developed for private party/site ownership. This site is considered an orphan project because the site owner does not have sufficient funds to investigate or remediate the site.

1.1 REMOVAL ACTION WORK PLAN ORGANIZATION

A brief description of each section of this report is presented below.

Executive Summary

1.0 Introduction—Includes the RAWP organization, site description, operational history, previous investigations, and RAWP objectives and approach.

2.0 Remedial Investigation Results—Summarizes the results of the RI.

3.0 Applicable or Relevant and Appropriate Requirements (ARARs) —Documents the regulatory requirements appropriate for this site and discusses the ARAR evaluation process.

4.0 Screening and Development of Removal Action Alternatives—Summarizes the technologies screened for potential application at this site. Describes the general response actions (GRAs) considered for this site, the RAOs, and the results of alternatives screening.

5.0 Detailed Analysis of Removal Action Alternatives—Provides the results of the detailed analyses of the proposed removal action alternatives and identifies the selected alternative.

6.0 Removal Action Implementation—Presents the work plan for implementation of the selected alternative.

7.0 References—Lists references used to prepare this document.

In addition, the RAWP includes appendices providing the Alternative 3 Cost Estimates (Appendix A); the Health and Safety Plan (HASP) addendum for this removal action (Appendix B); the Quality Assurance Project Plan (QAPP) (Appendix C); the Transportation Plan for Off-Site Disposal (Appendix D); and the Air Monitoring Plan (Appendix E).

1.2 SITE DESCRIPTION

Osage Industries, Inc., 60th Street West, is in Rosamond in Kern County, California, northeast of the intersection of 65th Street West and Irone Avenue. The site is situated on portions of three parcels in Kern County: two 20-acre parcels (parcel numbers 252-013-05 and 252-013-06) to the north and one 40-acre parcel (parcel number 252-013-07) to the south. Approximately 7.5 acres of the site are enclosed by a chainlink fence that spans the two northern parcels. Physical features on the site include four surface impoundments on the two northern parcels, a large warehouse, several trailers, a furnace, various pieces of heavy machinery, a large pile of unidentified ore material, and the remnants of a loading dock. The southern portion of the site includes containers of unidentified solids and liquids, remnants of former trailers, several plating tanks, portions of electrical transformers, large metal pressure vessels, and a storage van.

There is no surface water in the site vicinity. Weathered bedrock is encountered at depths of 2 to 20 feet below ground surface (bgs), beneath a layer of sandy decomposed granite. Depth to groundwater in the on-site well was measured at 34 feet bgs. The native soils in the area contain calcium carbonate with a pH of about 9 that could neutralize acids and retard the vertical migration of metals.

1.3 OPERATIONAL HISTORY

The former owner of the site operated a metal recovery operation from approximately 1972 to 1989. Industrial operations included: (1) on-site storage, milling, and smelting of ore containing base and precious metals; (2) recovery of scrap metal from various sources; (3) recovery of silver from electronic scrap; (4) the use of hazardous materials to process metals; and (5) the use of four ponds (also referred to as surface impoundments) to manage wastewater discharged from the operation. Scrap metal recovery and ore processing involved the use of solutions containing nitric acid and cyanide. In addition, plating solution waste containing high concentrations of metals was processed on site. On the southern parcel, mobile homes (trailers) were stripped, and the metals were recovered.

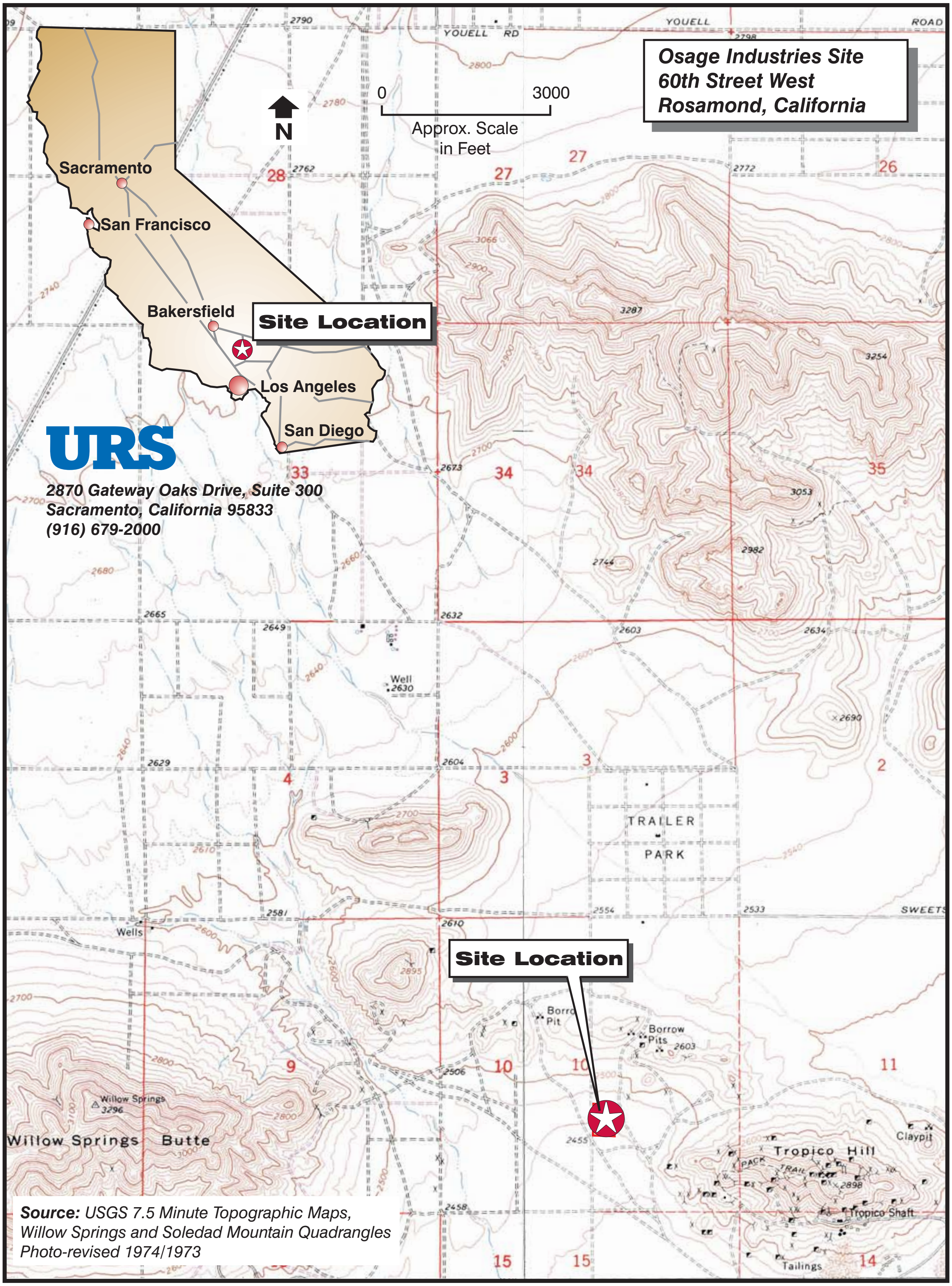

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Figure 1-1. Site Location Map
Osage Industries Site, Rosamond, CA

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1.4 PREVIOUS INVESTIGATIONS

Previous investigations performed are described in this section.

1988–1989

- Metcalf & Eddy performed a preliminary site investigation that involved collecting soil samples with a hand-driven sampling auger from four locations at the site and collecting one background sample approximately 200 yards northeast of the property. Additional samples were obtained in the Rosamond area for comparison with site-specific data. The analytical results revealed heavy metals contamination at three times the background concentrations for arsenic, barium, beryllium, chromium, cobalt, copper, lead, silver, and zinc; total arsenic and total beryllium concentrations exceeded cancer risk screening concentrations.
- The California Regional Water Quality Control Board (RWQCB), Lahontan Region, obtained surface and subsurface soil samples on three separate occasions from surface impoundments. Analytical results indicated metals contamination in excess of background concentrations for barium and lead from the eastern pond and for barium, beryllium, chromium, copper, lead, and zinc from the western impoundment.
- The RWQCB, Lahontan Region, obtained soil and sludge samples from a nitric acid pit. Soil sample results indicated metals contamination at three times background concentrations for arsenic, chromium, copper, lead, nickel, silver, and zinc. Sludge samples indicated metals contamination at three times the background concentrations for chromium, cobalt, lead, nickel, and zinc.
- Groundwater samples obtained by the RWQCB, Lahontan Region, from the on-site well in June and October 1989 indicated arsenic at 0.026 milligram per liter (mg/L), barium at 0.04 mg/L, and zinc at 0.89 mg/L. June 1989 arsenic levels in a groundwater sample from the on-site well were in excess of background concentrations obtained from a domestic well 0.4 mile to the northwest. October 1989 arsenic concentrations were below background concentrations in the on-site well.

1990

- C.C. Johnson and Malhotra conducted a site investigation in July 1990 that included eight surface soil samples and one groundwater sample. Barium, chromium, copper, lead, nickel, silver, zinc, cyanide, and PCBs (Arochlor®-1254) were detected in soil samples at greater than three times background. Beryllium, cadmium, cobalt, and vanadium concentrations also were reported at concentrations greater than background. The beryllium, PCBs (Arochlor®-1254), and dioxin concentrations exceeded their respective cancer risk screening concentrations.
- C.C. Johnson and Malhotra collected groundwater samples that were analyzed, in part, for arsenic, cyanide, and VOCs. Arsenic was reported at 0.102 mg/L, which is greater than three times the background concentration of 0.03 mg/L, from a domestic well 0.4 mile to the northwest of the site. Cyanide was reported at 12.6 micrograms per liter (µg/L), which is below the applicable benchmarks. The reference dose screening concentration benchmark for cyanide is 700 µg/L, and the maximum contaminant level/maximum contaminant level goal (MCL/MCLG) for cyanide is 200 µg/L. VOCs were not detected in the groundwater samples; it should be noted that high

dilution caused VOC detection limits to be elevated several times higher than the contract-required detection limits (CRDLs).

- Targhee, Inc., collected 14 surface soil samples from 6 inches bgs from two surface ponds and the nitric acid "boat" pit to establish "clean closure" of these areas for the RWQCB, Lahontan Region. The samples were collected after the areas had been excavated and the material reportedly had been transported off site. Based on previous sampling results, the soil samples were analyzed only for the target metals of copper, lead, and zinc. Two samples exceeded 10 times the soluble threshold limit concentration (STLC) value for total lead and were re-analyzed for soluble lead. The re-analyzed samples were below the established STLC value for lead (5 milligrams per kilogram [mg/kg]). Therefore, the RWQCB, Lahontan Region, accepted "clean closure" of the ponds and pit. No documentation has been produced to confirm that the excavated material was disposed of off site.

1991

- A hydrogeological assessment report by Morris Balderman (a California registered geologist) stated that the following remediation activities had occurred at the site: (1) The nitric acid tank had been emptied and removed and (2) most of the clay liner material from the eastern and western tailings ponds had been removed and transported off site for metals recovery.
- Targhee, Inc., submitted final closure and grading plans that indicated the ponds had been filled and regraded to at least 1% to promote surface water runoff away from the ponds. Final closure work was completed in September. However, a closure completion report signed by a California registered civil engineer or certified engineering geologist, stating that the work was completed as described and met accepted engineering practices for closure and certifying that no further work was needed for pond closure, was not submitted.

1993–1994

- URS prepared a federal facility preliminary assessment (PA) review report (URS, 1993).
- URS prepared a federal facility site investigation (SI) review report (URS, 1994).

2004–2005

- URS performed the RI and prepared the RI report (URS, 2005) (see Section 2.0).
- URS removed debris in August 2004 (this included the removal of debris and ash from ash pile sites 1 through 4 and the removal of soil from stained soil location DS-1).

2006

- URS performed a cultural resources records search utilizing Southern San Joaquin Valley Information Center under contract to the State Office of Historic Preservation.

1.5 CULTURAL RESOURCES RECORDS SEARCH

The southern San Joaquin Valley Information Center under contract to the State Office of Historic Preservation conducted the historic resources inventory on the subject site. The following are the results of a search of the cultural resources files at the Southern San Joaquin Valley Archaeological Information Center. These files include known and recorded archaeological and historic sites, inventory and excavation reports filed with the office. This records search, including copies of all report title pages and complete copies of the cultural resource site records for the resources within a one-mile radius of the subject site are displayed in Appendix F.

According to the information in the files, there have been no cultural resources studies conducted within the project area. There have been two cultural resource surveys conducted within a half-mile radius and two surveys within a one-mile radius. The survey locations and report designations are shown in a map in Appendix F.

There are no recorded cultural resources within the project area and it is not known if resources exist there. There are eleven recorded cultural resources within a half-mile radius and eight resources within a one-mile radius of the subject site. See the map in Appendix F for resource locations and their associated primary numbers.

1.6 RAWP OBJECTIVES AND APPROACH

The objective of this RAWP is to use the RI findings and the HRA results to present potential site restoration alternatives that are consistent with the site RAOs and to recommend a cost-effective, implementable removal action that restores the site to a condition consistent with these RAOs and applicable regulations.

The approach will be to present and screen technologies for site restoration, develop viable removal action alternatives, compare the alternatives, and select an appropriate removal action alternative.

2.0 REMEDIAL INVESTIGATION RESULTS

This section summarizes the results of the RI performed by URS from January 2004 through June 2005. A detailed description of the RI activities can be found in the RI report (URS, 2005), from which some sections have been summarized here, as appropriate, for the remedy selection process. Specifically, the RI sampling activities are summarized, followed by a summary of the sampling results and the results of the baseline human HRA. The final subsection includes an overall summary, conclusions, and recommendations.

RI activities began in January 2004 and continued through June 2005. The following investigative activities were conducted at the site.

- A soil investigation to assess the lateral and vertical extent of contamination in soils.
- An on-site domestic well water characterization to determine whether previous site activities had impacted groundwater in the western portion of the site.
- A background soil characterization to determine background concentrations of selected analytes.
- Containerization and disposal of ash piles and ash-filled drums at the site. The top 3 inches of soil beneath the piles also were collected and used to characterize the native soils at these locations. The ash was contained within plastic 55-gallon drums, and the top 3 inches of soil beneath was excavated and contained in a soil bin. The soil and ash were subsequently disposed of at a Class 1 landfill facility. The ash was characterized as hazardous waste.

Following are the areas of investigation and their contaminants of concern (COCs).

Area of Investigation	Contaminant of Concern
• Ponds: West Pond; East Ponds (small east, west, and south ponds)	Metals, polynuclear aromatic hydrocarbons (PAHs), pH, cyanide
• Nitric Acid Storage "Boat" Pit	Metals, pH, cyanide
• Oily/stained surface soil areas	PAHs, PCBs, dioxins
• Ore piles and underlying soil piles were located to the southeast of the fenced area and inside the fenced area to the north	Metals
• On-site groundwater well	Metals, cyanide, total petroleum hydrocarbons as diesel (TPH-d), general minerals, pH
• Battery pit, northeast of building	Metals, pH
• Ash piles and drums in southern portion of facility	Metals and dioxins/furans
• Inside facility fenced area, 13 areas with random biased contamination	Metals or dioxins/furans
• Desert area outside of facility fencing; background determined from random samples from 6 areas	Metals and/or dioxins/furans

2.1 SOIL INVESTIGATION

Surface soil samples (0 inch to 6 inches bgs) and near-surface soil samples (18 inches to 24 inches bgs) were collected from 13 locations where shallow soil contamination was suspected. Surface soil samples also were collected from 14 random areas within the site boundaries. RI sample locations are indicated on Figure 2-1. To identify the vertical extent of contamination, 12 soil borings were completed at the locations shown on Figure 2-1. The maximum boring depths ranged from 10 to 25 feet bgs. Generally, samples were collected at the surface and at 2 feet bgs, 5 feet bgs, and 10 feet bgs at the boring locations. Eight borings were installed in the ponds, two borings in the ore piles, one boring in the battery pit, and one boring in an oil-stained area.

Groundwater was not encountered in any of the soil borings drilled during the RI.

2.1.1 Soil Sample Analysis

Soil samples were submitted to the analytical laboratory for the following selected analyses:

- CAM 17 metals by SW6010B plus mercury by United States Environmental Protection Agency (EPA) Method SW7470A;
- Cyanide by EPA Method SW9010B;
- PCBs by EPA Method SW8082;
- PAHs by EPA Method SW8310;
- General minerals by EPA Methods E300.0 and 340.2; and
- Dioxins and furans by EPA Method SW8290.

If the sample concentration exceeded by 10 times the respective STLC for a parameter, a leachate sample was prepared using the California waste extraction test (WET). The leachate sample was then analyzed by the appropriate method.

2.1.2 Background Soil Sampling

To assess background conditions for the risk assessment, six surface soil samples (BG-1 through BG-6) were collected with a hand trowel from various locations surrounding the site (Figure 2-1). The samples were analyzed for CAM 17 metals and dioxins/furans.

2.2 SOIL SAMPLING RESULTS

2.2.1 Total Metals

Title 22 metals were reported in all 71 samples that were analyzed for metals. The maximum concentrations of metals detected in soil samples were as follows: antimony (2,180 mg/kg), arsenic (162 mg/kg), barium (4,310 mg/kg), beryllium (48.8 mg/kg), cadmium (5,090 mg/kg), chromium (128 mg/kg), cobalt (30.5 mg/kg), copper (10,800 mg/kg), lead (78,000 mg/kg), mercury (15.7 mg/kg), molybdenum (335 mg/kg), nickel (140 mg/kg), selenium (95.8 mg/kg), silver (182 mg/kg), thallium (5.7 mg/kg), vanadium (35.2 mg/kg), and zinc (221,000 mg/kg). The samples of ash material from ash pile 2 and from the corroded drums contained

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Figure 2-1. Soil Sample Locations
Osage Industries Site, Rosamond, CA

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concentrations of antimony, cadmium, and lead well above the respective industrial preliminary remediation goal (PRG) levels. Ash pile 2 was subsequently excavated and containerized in a bin. The corroded drums have not yet been contained.

High levels of cadmium (5,090 mg/kg) were reported in the sample from ash pile 2. High cadmium concentrations also are likely to be present in ash pile 4, which was not analyzed for metals. Four of the five sample locations with high cadmium concentrations are downwind from (east of) ash pile 2 and ash pile 4. The fifth location (DS1) is probably a former ash pile location. To prevent any additional wind distribution of this ash material, the ash piles were subsequently containerized for disposal in August 2004. Cadmium concentrations above residential PRGs in the shallow soil samples are presented on Figure 2-2.

Based on the distribution of background arsenic concentrations, it appears likely that most, if not all, of the arsenic concentrations reported in soil samples occur naturally. However, analysis of one sample collected from the ash material inside one of the remaining corroded drums that was not containerized reported an arsenic concentration of 1,400 mg/kg, which is well above the non-cancer industrial PRG of 260 mg/kg. A sample collected from the transformer on November 9, 2004, contained elevated levels of arsenic (253 mg/kg).

The depth of metals contamination associated with the corroded drums, the transformer, and ash pile 1 were defined by shallow soil samples collected on May 8, 2005. Analytical results for these samples defined the vertical extent of metals at less than 0.5 foot bgs at the corroded drum location and at 1 foot bgs at the transformer location. In addition, the vertical extent of dioxins/furans contamination associated with ash pile 1 was defined at less than 1 foot bgs.

2.2.2 Leachate Metals Analyses

For 21 samples, concentrations were reported for one or more metals greater than 10 times their respective STLCs (see the top of Table 2-1). These samples were reanalyzed for leachate concentrations using the California WET method. Results of the leachate analyses (presented on Table 2-2) were compared to the respective STLCs shown at the top of Table 2-2. This comparison indicated that 16 samples (from 11 sample locations) exceeded the STLC for one or more metals, including 9 samples for cadmium, 5 samples for copper, and 7 samples for lead. The vertical extent of metals concentrations above toxicity limits was defined (limited) for 11 of these samples by deeper vertical samples. However, the vertical extent of metals concentrations above toxicity limits remained undefined for 4 of the surface soil samples, where deeper samples were not collected during the initial sampling event. These 4 samples included DS-1, DS-2, ash pile 2, and SPIT1-0.5. To fill these data gaps, URS collected deeper soil samples from 1 and 2 feet bgs at each of these locations on April 7, 2004. Results for these samples, which are included in Table 2-1, indicate that the vertical extent of metals-impacted soil is limited to less than 1 foot bgs at these four locations.

Four point composite soil samples were collected from the bin of excavated soil and from the plastic drums containing the ash material. These samples were analyzed for metals by the toxicity characteristic leaching procedure (TCLP) to determine disposal requirements for the material. The results for these analyses, which are shown in Table 2-2, indicate that both samples had concentrations exceeding the TCLP limit of 5 mg/L for lead (22 CCR 66261.24[a][1][B]) and that the drum sample also exceeds the TCLP limit of 1 mg/L for cadmium. As a result, the materials in the bin and plastic drums were classified as a Resource Conservation and Recovery Act (RCRA) hazardous waste. The drummed materials were subsequently consolidated and disposed of at a Class 1 landfill in January 2005.

2.2.3 PAHs

Twenty-eight soil samples and two duplicate samples were analyzed for PAHs. Indeno(1,2,3-c,d)pyrene was reported in three soil samples and one duplicate sample. The maximum concentration of this PAH (280 micrograms per kilogram [μg/kg]) was reported in sample OS3-0.5. This concentration is well below the industrial PRG of 2,100 μg/kg for indeno(1,2,3-c,d)pyrene.

2.2.4 PCBs

Ten soil samples from dark-stained soil areas, one sample from the transformer, and one duplicate soil sample were analyzed for PCBs. PCBS were not detected above laboratory reporting limits in any of the samples.

2.2.5 Dioxins and Furans

Dioxins and furans are a group of 17 congeners, each of which is assigned a potency factor based on the potency of each isomer relative to the potency of 2,3,7,8- tetrachlorodibenzo-p-dioxin (TCDD), to assess toxicity and risk. The potency values used for this investigation (or removal action) are based on the World Health Organization (WHO) toxicity equivalency factor (TEF_{WHO-97}) values for the calculation of the toxicity equivalencies for the detected polychlorinated dibenzo-p-dioxin (PCDD) and polychlorinated dibenzofuran (PCDF) potency relative to that of 2,3,7,8-TCDD. The concentration of each individual PCDD or PCDF congener is multiplied by the congener-specific TEF_{WHO-97} (0, 0.001, 0.01, 0.5, or 1) to convert the concentration to an equipotent or toxic equivalence of 2,3,7,8-TCDD, which has a TEF_{WHO-97} value of 1. The 2,3,7,8-TCDD equivalent potencies of these PCDD or PCDF isomers are then summed (as shown on Table 2-3 and presented on Figure 2-3) to provide a total 2,3,7,8-TCDD toxicity equivalent (TEQ) for each sample analyzed for dioxins.

Calculated TEQ values for the 28 soil or ash samples that were analyzed for dioxins and furans were compared to the PRG for dioxins/furans in soils at industrial sites. Of the 28 samples, 15 exceeded the industrial PRG TEQ value of 16 picograms per gram (pg/g). Reported TEQ values exceeding the industrial PRG are highlighted in bold on Table 2-3. The highest concentrations of dioxins/furans were reported in ash samples collected from the ash piles and drums, as discussed hereafter. Elevated concentrations of dioxins/furans also were reported in shallow soil samples collected east-southeast (downwind) from the ash piles and furnace.

2.2.5.1 Ash Samples

Four piles of ash have been identified to the south of the fenced area (Figure 2-3), and several drums of ash are located adjacent to several of these ash piles. These four ash piles were sampled for dioxins/furans. Analysis of the sample collected from the surface of ash pile 3 (Figure 2-3) reported the highest concentrations of dioxins/furans, with a TEQ of 1,031,214 pg/g. The second highest concentration of dioxins/furans, with a TEQ of 162,004 pg/g, was collected from the surface of ash pile 2 (Figure 2-3). Analysis of the sample collected from ash pile 4 reported a TEQ value of 33,944 pg/g. The TEQ value calculated for the ash sample collected from the furnace was 1,736 pg/g.

TABLE 2-1

Metals in Soil Samples
Osage Industries Site
Rosamond, California

				Total Metals by EPA SW6010B																		
				Antimony	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Vanadium**	**Zinc**	**pH**	**Cyanide**
	Sample	**Date**	**10 X STLC**	**150**	**50**	**1,000**	**7.5**	**10**	**50**	**800**	**250**	**50**	**2**	**3,500**	**200**	**10**	**50**	**70**	**240**	**2,500**	**NA**	**NA**
	Depth	**Sample**	**Res. PRGs**	**31**	**22/0.39**	**5,400**	**150**	**37**	**210**	**900**	**3,100**	**400**	**23**	**390**	**1,600**	**390**	**390**	**5.2**	**550**	**23,000**	**NA**	**1,200**
Sample ID	**(feet bgs)**	**Collected**	**Ind. PRGs**	**410**	**260/1.6**	**67,000**	**2,200**	**450**	**450**	**1,900**	**41,000**	**750**	**310**	**5,100**	**20,000**	**5,100**	**5,100**	**67**	**7,200**	**100,000**	**NA**	**12,000**
EPW1-7.0	7.0	1/27/04		ND	3.04	45.2	0.375	ND	4.54	3.81	3.61	3.43	ND	ND	2.69	ND	0.288	ND	13.4	38.8	9.87	ND
EPW1-10.0	10.0	1/27/04		ND	4.38	123	0.259	ND	16.6	6.03	1.52	1.97	ND	0.743	2.21	1.18	ND	ND	26.0	80.7	9.53	ND
EPW2-6.0	6.0	1/27/04		ND	6.23	73.9	0.358	ND	9.26	4.15	4.81	4.18	ND	0.318	3.94	1.02	ND	ND	17.2	36.2	9.61	ND
EPW2-10.0	10.0	1/27/04		ND	2.30	70.5	ND	ND	16.1	3.13	1.46	1.85	ND	0.565	2.13	ND	ND	ND	12.3	44.4	9.32	ND
EPE1-5.5	5.5	1/27/04		ND	8.76	43.1	0.455	ND	6.99	4.34	5.01	4.60	ND	ND	4.55	ND	ND	ND	23.1	35.0	9.36	ND
EPE1-10.0	10.0	1/27/04		ND	0.930	68.8	ND	ND	10.1	3.55	1.27	1.38	ND	ND	2.21	ND	ND	ND	12.9	48.6	9.19	ND
EPE2-4.0	4.0	1/27/04		ND	2.62	63.0	0.259	ND	2.57	3.86	2.28	2.67	ND	ND	2.76	0.842	ND	ND	13.0	40.8	9.54	ND
EPE2-10.0	10.0	1/27/04		ND	ND	66.1	ND	ND	1.75	4.01	1.72	1.35	ND	ND	0.877	0.857	ND	ND	13.4	58.2	9.07	ND
EPS2-6.5	6.5	1/27/04		ND	3.78	30.2	ND	ND	6.10	1.95	2.79	2.18	ND	0.661	2.05	ND	ND	ND	11.0	17.6	9.88	ND
EPS2-10.0	10.0	1/27/04		ND	1.39	88.1	ND	ND	2.67	4.76	1.19	3.05	ND	ND	1.45	0.835	ND	ND	16.8	72.8	9.48	ND
EPS1-6.5	6.5	1/27/04		ND	3.22	53.8	0.257	ND	3.43	2.89	2.60	3.39	ND	ND	2.04	ND	ND	ND	12.4	28.1	9.91	ND
EPS1-10.0	10.0	1/27/04		ND	3.68	48.2	0.258	ND	34.8	2.82	2.39	2.54	ND	1.56	13.0	ND	ND	ND	9.02	36.0	9.69	ND
WP1-3.0	3.0	1/27/04		ND	5.15	70.0	0.366	ND	3.58	3.71	4.39	4.54	ND	0.357	2.50	1.32	ND	ND	13.8	40.7	9.05	ND
WP1-10.0	10.0	1/27/04		ND	2.91	36.4	0.283	ND	1.67	1.40	0.621	5.14	ND	0.255	0.530	ND	ND	ND	6.13	22.7	9.31	ND
WP2-4.0	4.0	1/27/04		ND	2.36	62.5	0.344	ND	3.91	3.51	3.45	3.65	ND	ND	2.56	ND	ND	ND	14.6	38.2	8.77	ND
WP2-10.0	10.0	1/27/04		ND	1.69	23.3	ND	ND	17.0	1.31	4.12	5.14	ND	1.55	2.20	ND	0.488	ND	5.12	18.1	9.28	ND
WP2-10.0D	10.0	1/27/04		ND	2.03	25.7	ND	ND	17.1	1.27	4.00	5.51	ND	1.55	1.82	ND	0.289	ND	5.08	18.9	9.13	ND
BP1-0.5	0.5	1/27/04		0.800	7.92	129	0.833	0.951	10.3	5.17	75.4	547	ND	6.04	11.7	ND	19.1	ND	18.3	365	8.16	—
BP1-2.0	2.0	1/27/04		ND	5.59	74.0	0.587	ND	6.82	4.49	4.64	6.08	ND	ND	4.51	0.847	ND	ND	28.5	43.8	8.61	—
BP2-1.0	1.0	1/27/04		ND	6.31	87.0	0.470	ND	9.44	5.68	10.3	688	ND	2.08	7.04	0.981	1.38	ND	23.4	61.1	9.20	—
BP2-5.0	5.0	1/27/04		ND	4.68	187	0.324	ND	4.41	3.79	2.01	4.54	ND	ND	1.63	0.841	ND	ND	23.9	61.3	8.79	—
BP2-10.0	10.0	1/27/04		ND	1.68	86.0	ND	ND	17.0	4.09	3.59	4.59	ND	1.13	2.87	ND	ND	ND	16.4	55.3	9.03	—
SOP2-1.0	1.0	1/27/04		1.73	36.2	77.0	1.87	ND	13.1	4.76	52.0	24.2	ND	4.56	5.82	ND	ND	ND	21.0	102	—	—
SOP2-5.0	5.0	1/27/04		ND	11.5	24.8	1.12	ND	2.44	1.73	3.28	2.78	0.0911	1.70	1.32	ND	ND	ND	4.07	7.66	—	—
SOP2-10.0	10.0	1/27/04		ND	7.55	27.4	1.41	ND	16.6	1.56	15.3	12.1	ND	2.69	2.32	ND	ND	ND	5.15	19.3	—	—
SOP2R @ 0.5	0.5	5/8/05		2.56	19.1	85.5	0.718	ND	11.2	7.00	11.2	5.04	ND	ND	8.92	ND	0.272	ND	22.0	51.9	—	—
SOP2R @ 1	1.0	5/13/05		1.24	30.2	97.5	0.662	ND	12.9	8.40	11.0	6.41	ND	ND	9.33	ND	ND	ND	25.5	45.8	—	—
NOP1-0.5	0.5	1/27/04		ND	17.5	66.2	0.306	25.4	3.33	7.73	2,400	**3,950**	ND	4.30	4.15	0.820	12.3	ND	2.98	3760	—	—
NOP1-1.0	1.0	1/27/04		ND	7.31	73.5	0.330	1.22	3.08	2.38	172	234	0.115	0.588	1.58	ND	0.917	ND	6.38	212	—	—
NOP1-2.0	2.0	1/27/04		ND	2.47	54.4	ND	ND	0.996	1.97	9.08	18.5	ND	ND	1.25	ND	ND	ND	6.79	50.6	—	—
NOP2-0.5	0.5	1/27/04		ND	2.14	40.2	0.298	ND	4.96	2.36	7.20	8.86	ND	0.589	2.11	ND	ND	ND	10.3	40.1	—	—
NOP2-5.0	5.0	1/27/04		ND	1.83	39.0	0.321	ND	2.31	1.68	2.69	3.28	ND	ND	0.832	ND	ND	ND	5.74	31.1	—	—
NOP2-10.0	10.0	1/27/04		ND	0.932	46.6	ND	ND	11.2	2.04	6.36	8.59	ND	0.698	1.10	ND	ND	ND	6.85	42.9	—	—
Furnace	0.5	1/27/04		ND	65.8	4310	ND	16.5	43.0	18.1	595	195	0.999	ND	98.6	21.0	67.5	1.30	9.39	169	—	—
White Sand	0.0	11/9/04		1.73	1.55	50.3	0.322	2.28	6.19	4.05	89.8	56.4	ND	0.758	29.0	ND	10.4	ND	3.8	144	—	—
Black Sand	0.0	11/9/04		3.64	ND	15.4	ND	1.17	7.64	794	73.4	66.2	ND	1.30	14.3	1.31	2.56	ND	53.0	131	—	—
Crucible	0.0	11/9/04		2.94	3.13	17.8	ND	1.23	9.39	2.36	261	44.8	ND	1.87	41.1	ND	6.58	ND	117	50.3	—	—
Transformer	0.0	11/9/04		474	253	44.5	0.755	121	280	9.24	2,540	**9,520**	28.7	35.5	132	23.0	102	ND	ND	3,190	—	—
Transformer @ 1	1.0	5/8/05		2.04	9.64	79.4	0.503	23.2	13.1	9.09	53.1	46.0	0.865	ND	29.0	ND	0.489	ND	22.9	572	—	—
Corroded Drums	0.0	11/9/04		**8,580**	**1,400**	178	4.01	**707**	74.1	10.6	7,730	**66,100**	75.1	80.3	86.8	107	158	ND	ND	33,600	—	—
Cor.Drums @ 0.5	0.5	5/8/05		ND	3.71	76.3	0.561	16.2	13.2	8.29	12.0	9.98	0.227	ND	9.3	ND	0.574	ND	27.8	193	—	—
Cor.Drums @ 1	1.0	5/8/05		ND	2.23	56.4	0.395	ND	7.8	5.74	5.81	9.59	ND	ND	6.28	ND	ND	ND	19.4	43.3	—	—

TABLE 2-1

(Continued)

				Total Metals by EPA SW6010B																				
				Antimony	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Vanadium**	**Zinc**	**pH**	**Cyanide**
	Sample	**Date**	**10 X STLC**	**150**	**50**	**1,000**	**7.5**	**10**	**50**	**800**	**250**	**50**	**2**	**3,500**	**200**	**10**	**50**	**70**	**240**	**2,500**	**NA**	**NA**
	Depth	**Sample**	**Res. PRGs**	**31**	**22/0.39**	**5,400**	**150**	**37**	**210**	**900**	**3,100**	**400**	**23**	**390**	**1,600**	**390**	**390**	**5.2**	**550**	**23,000**	**NA**	**1,200**
Sample ID	**(feet bgs)**	**Collected**	**Ind. PRGs**	**410**	**260/1.6**	**67,000**	**2,200**	**450**	**450**	**1,900**	**41,000**	**750**	**310**	**5,100**	**20,000**	**5,100**	**5,100**	**67**	**7,200**	**100,000**	**NA**	**12,000**
DS-1	0.5	1/27/04		ND	5.74	99.7	0.622	56.9	8.88	6.04	31.0	18.8	1.33	ND	7.38	1.13	ND	ND	22.1	583	—	—
DS1-1.0	1.0	4/7/04		ND	3.50	67.8	0.420	ND	7.94	5.21	5.80	5.08	0.0835	0.250	6.03	ND	ND	ND	20.9	46.6	—	—
DS-2	0.5	1/27/04		ND	9.00	212	2.02	27.7	33.7	6.33	156	184	0.308	0.848	33.1	1.31	115	ND	15.8	917	—	—
DS2-1.0	1.0	4/7/04		ND	4.17	80.2	0.464	ND	9.65	5.91	6.93	5.67	0.329	ND	7.42	ND	ND	ND	22.8	49.7	—	—
R-1	0.2	1/27/04		ND	4.69	96.2	0.553	ND	9.87	6.08	13.0	10.1	ND	ND	23.4	ND	0.829	ND	23.3	63.7	—	—
R-2	0.2	1/27/04		ND	4.43	91.3	0.519	5.01	11.2	6.94	181	14.5	ND	0.396	110	0.909	33.7	ND	21.9	79.9	—	—
R-3	0.2	1/27/04		ND	5.28	96.9	0.436	0.622	9.09	5.44	11.1	50.2	ND	ND	14.5	1.59	4.01	ND	21.5	99.0	—	—
R-4	0.2	1/27/04		ND	3.71	88.7	0.421	0.925	7.78	4.67	8.35	8.10	0.0838	ND	6.65	ND	1.46	ND	17.7	56.4	—	—
R-5	0.2	1/27/04		42.8	5.85	99.3	0.648	3.89	12.2	6.24	76.9	131	0.291	2.96	22.4	1.02	88.6	ND	20.0	212	—	—
SOP1-0.5	0.5	1/27/04		2.98	ND	774	48.8	2.00	97.0	30.5	511	109	ND	73.0	50.6	4.76	169	ND	21.4	5860	—	—
SOP1-2.0	2.0	1/27/04		ND	4.71	255	17.9	1.45	32.4	11.9	186	47.2	ND	16.6	24.7	1.14	53.5	ND	22.3	1260	—	—
OS1-0.5	0.5	1/27/04		9.03	7.02	77.1	0.503	166	9.89	13.6	633	**1,700**	0.580	4.75	16.8	1.55	40.1	ND	18.0	2740	—	—
OS1-10.0	10.0	1/27/04		ND	4.16	62.1	0.344	ND	7.17	5.39	5.81	4.25	ND	0.504	6.09	ND	ND	ND	20.6	48.2	—	—
OS1-2.0	2.0	1/27/04		ND	4.13	77.9	0.452	40.0	9.54	6.20	22.2	41.1	ND	ND	7.65	1.02	ND	ND	21.7	554	—	—
OS1-5.0	5.0	1/27/04		ND	5.36	74.9	0.376	ND	7.53	5.03	5.30	3.85	ND	ND	5.24	ND	ND	ND	21.0	45.1	—	—
OS2-0.5	0.5	1/27/04		7.22	5.12	70.9	0.393	2.28	11.6	4.03	113	292	0.156	6.10	8.29	2.15	195	ND	14.5	182	—	—
OS2-2.0	2.0	1/27/04		ND	3.07	49.4	0.320	ND	7.11	3.86	9.33	17.3	ND	ND	4.70	ND	146	ND	17.2	40.8	—	—
OS2D-0.5	0.5	1/27/04		ND	3.41	80.9	0.367	3.80	9.34	6.10	7.08	9.72	ND	ND	7.12	0.790	ND	ND	20.3	63.2	—	—
OS3-0.5	0.5	1/27/04		ND	6.68	74.4	0.983	0.840	15.8	12.1	87.9	18.4	ND	5.79	23.2	ND	1.63	ND	35.2	85.0	—	—
OS3-2.0	2.0	1/27/04		ND	3.45	67.6	0.697	ND	11.8	13.9	62.8	15.0	ND	1.69	24.2	ND	1.70	ND	28.2	71.4	—	—
OS4-0.5	0.5	1/27/04		ND	6.92	93.0	0.466	6.71	12.2	6.16	78.6	37.5	0.206	2.23	13.1	ND	57.4	ND	18.6	619	—	—
OS4-2.0	2.0	1/27/04		ND	5.03	69.9	0.624	3.87	11.1	4.84	36.1	19.9	0.308	ND	9.22	0.799	3.54	ND	23.2	601	—	—
OS5-0.5	0.5	1/27/04		ND	3.84	77.1	0.707	0.955	9.96	5.88	140	70.0	ND	ND	10.1	0.780	ND	ND	22.0	115	—	—
OS5-2.0	2.0	1/27/04		ND	3.91	86.4	0.545	ND	6.98	7.17	18.2	28.8	ND	ND	8.39	ND	ND	ND	20.2	90.9	—	—
OS6-0.5	0.5	1/27/04		ND	4.73	81.0	0.453	170	12.7	15.1	580	16.1	ND	0.735	135	ND	49.4	ND	20.0	503	—	—
OS6-2.0	2.0	1/27/04		ND	4.49	71.7	0.430	5.92	8.12	5.77	15.3	5.33	ND	ND	10.1	ND	0.301	ND	20.8	63.7	—	—
OS6D-0.5	0.5	1/27/04		ND	3.51	84.8	0.426	96.5	10.3	17.5	249	9.28	ND	ND	140	1.18	3.89	ND	20.5	597	—	—
OS6DR @ 0.5	0.5	5/8/05		ND	2.66	78.5	0.497	21.1	10.7	8.18	7.35	6.75	ND	ND	9.87	ND	ND	ND	22.6	859	—	—
OS6DR2 @ 10.5	Duplicate	5/8/05		ND	2.48	89.9	0.477	17.9	10.9	8.13	7.34	12.5	ND	ND	10.10	ND	ND	ND	23.1	1,000	—	—
OS7-0.5	0.5	4/7/04		ND	3.51	74.1	0.411	87.0	9.22	9.42	474	9.53	ND	ND	82.9	ND	1.07	ND	18.4	210	—	—
SPIT1-0.5	0.5	1/27/04		ND	11.8	248	2.04	92.6	26.5	16.5	382	140	0.181	ND	92.3	3.44	54.2	ND	38.3	764	—	—
SPIT1-1.0	1.0	4/7/04		ND	5.36	79.3	0.53	ND	9.35	5.81	5.39	5.21	ND	ND	6.13	ND	ND	ND	28.90	47.20	—	—
Ashpile 1-0.5	0.5	1/27/04		ND	70.5	477	5.93	32.2	128	15.4	10,700	**6,960**	3.27	6.40	40.9	2.34	128	ND	7.35	5,720	—	—
Ashpile 1 @ 1.5	1.5	5/8/05		ND	3.72	75.90	0.453	ND	10.3	7.12	15.2	10.4	ND	ND	7.93	ND	0.33	ND	23.90	55.7	—	—
Ashpile 1-2.0	2.0	1/27/04		ND	6.01	93.9	0.534	0.569	10.9	6.02	101	60.0	ND	ND	7.31	1.36	1.80	ND	22.8	104	—	—
Ashpile 2	0.5	1/27/04		**2,180**	162	13.6	2.00	**5,090**	46.4	1.91	10,800	**78,000**	15.7	335	60.8	95.8	182	5.74	ND	**221,000**	—	—
Ashpile2-1.0	1.0	4/7/04		ND	5.26	82.00	0.491	108	10.5	6.51	9.07	17.5	ND	ND	7.86	ND	ND	ND	26.4	71.6	—	—
Ashpile 2 surf		9/17/04		10.40	4.50	94.70	0.513	2.67	11.5	7.54	31.5	114	ND	ND	9.70	ND	1.15	ND	22.5	120	—	—
Ashpile 3 surf		9/17/04		ND	4.16	112	0.585	2.30	12.9	7.93	9.95	8.80	ND	ND	10.5	ND	0.865	ND	27.2	83.7	—	—
BG-1	0.2	1/27/04		ND	3.17	73.0	0.355	ND	5.75	4.48	4.62	4.45	ND	ND	7.16	ND	ND	ND	16.2	45.0	—	—
BG-2	0.2	1/27/04		ND	3.19	82.7	0.406	ND	9.17	5.87	6.86	4.98	ND	ND	6.98	0.957	ND	ND	21.5	43.5	—	—
BG-3	0.2	1/27/04		ND	4.70	92.5	0.435	ND	11.3	6.44	7.44	5.20	ND	ND	7.94	1.08	ND	ND	23.5	52.1	—	—
BG-4	0.2	1/27/04		ND	7.55	77.1	0.425	ND	8.97	5.44	6.73	5.76	ND	ND	6.69	ND	ND	ND	20.5	47.9	—	—

TABLE 2-1

(Continued)

Sample ID	Sample Depth (feet bgs)	Date Sample Collected		Total Metals by EPA SW6010B																		
				Antimony	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Cobalt**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Selenium**	**Silver**	**Thallium**	**Vanadium**	**Zinc**	**pH**	**Cyanide**
			10 X STLC	**150**	**50**	**1,000**	**7.5**	**10**	**50**	**800**	**250**	**50**	**2**	**3,500**	**200**	**10**	**50**	**70**	**240**	**2,500**	**NA**	**NA**
			Res. PRGs	**31**	**22/0.39**	**5,400**	**150**	**37**	**210**	**900**	**3,100**	**400**	**23**	**390**	**1,600**	**390**	**390**	**5.2**	**550**	**23,000**	**NA**	**1,200**
			Ind. PRGs	**410**	**260/1.6**	**67,000**	**2,200**	**450**	**450**	**1,900**	**41,000**	**750**	**310**	**5,100**	**20,000**	**5,100**	**5,100**	**67**	**7,200**	**100,000**	**NA**	**12,000**
BG-5	0.2	1/27/04		ND	10.5	73.2	0.443	ND	9.01	5.98	7.72	7.97	ND	ND	8.82	0.790	ND	ND	19.7	43.1	—	—

bgs = below ground surface
EPA = U.S. Environmental Protection Agency
ID = identification
Ind. PRG = preliminary remediation goal concentrations for industrial soil
mg/kg = milligrams per kilogram
NA = not applicable
ND = analyte not detected above method detection limit
Res. PRG = preliminary remediation goal concentrations for residential soil
STLC = soluble threshold limit concentration
— = not measured

All concentrations reported in mg/kg.
Concentrations in **bold** exceed preliminary remediation goal concentrations for industrial soils.
PRG values for arsenic listed as non-cancer/cancer endpoints.
Highlighted arsenic concentrations are more than 5 times background concentration.

Table 2-2

Soluble Metals in Soil Samples
Osage Industries Site
Rosamond, California

Sample ID	Sample Depth (feet bgs)	Date Sample Collected	California WET Analyses																		
			Antimony STLC 15	Arsenic STLC 5.0	Barium STLC 100	Beryllium STLC 0.75	Cadmium STLC 1.0	Chromium STLC 5	Cobalt STLC 80	Copper STLC 25	Lead STLC 5.0	Mercury STLC 0.2	Molybdenum STLC 350	Nickel STLC 20	Selenium STLC 1.0	Silver STLC 5	Thallium STLC 7.0	Vanadium STLC 24	Zinc STLC 250	pH STLC NA	Cyanide STLC NA
BP2-1.0	1.00	1/27/04									**18.4**										
NOP1-0.5	0.50	1/27/04					0.68			**75.2**	**207**								90.70		
NOP1-1.0	1.00	1/27/04									1.36										
BP1-0.5	0.50	1/27/04									4.01										
Furnace	0.50	1/27/04		0.35	7.63		0.61			20.2	3.83				**1.62**						
DS-1	0.50	1/27/04					**4.94**														
DS-2	0.50	1/27/04					**2.21**				**14.4**										
R-3	0.50	1/27/04									2.76										
R-5	0.50	1/27/04									4.76										
SOP1-0.5	0.50	1/27/04				**2.12**		1.17		13.9	1.57								198		
SOP1-2.0	2.00	1/27/04				0.45															
OS1-0.5	0.50	1/27/04					**19.4**			**38.8**	**85.3**								**257**		
OS1-2.0	2.00	1/27/04					**2.53**														
OS2-0.5	0.50	1/27/04									**13.0**										
OS5-0.5	0.50	1/27/04									0.88										
SPIT1-0.5	0.50	1/27/04					**7.62**			22.9	**9.18**										
OS6-0.5	0.50	1/27/04					**16.7**			**40.3**											
OS6D-0.5	0.50	1/27/04					**9.61**														
Ash pile 1-0.5	0.50	1/27/04		1.11			**1.52**	**11.8**		**798**	**52.0**	0.0158							**301**		
Ash pile 1-2.0	2.00	1/27/04									**6.79**										
Ash pile 2	0.50	1/27/04	**34.2**	0.37			**385**			**727**	4.46	0.0970			**5.93**				**2,710**		

Concentrations in **bold** exceed STLC

Sample ID	Sample Depth (feet bgs)	Date Sample Collected	TCLP Analyses																		
			Antimony TCLP NA	Arsenic TCLP 5.0	Barium TCLP 100	Beryllium TCLP NA	Cadmium TCLP 1.0	Chromium TCLP 5	Cobalt TCLP NA	Copper TCLP NA	Lead TCLP 5.0	Mercury TCLP 0.2	Molybdenum TCLP NA	Nickel TCLP NA	Selenium TCLP 1.0	Silver TCLP 5	Thallium TCLP NA	Vanadium TCLP NA	Zinc TCLP NA	pH TCLP NE	Cyanide TCLP NE
4pt.Comp. Bin		9/17/2004	ND	ND			0.198	ND		55.4	**30.7**	ND				ND			21.2		
4pt.Comp. Drums		9/17/2004	0.883	ND			**11.8**	ND		100	**510**	**0.25**				ND			1,200		

bgs = below ground surface
ID = identification
mg/L = milligrams per liter
NA = not applicable
ND = analyte not detected above method detection limit
NE = not established
STLC = soluble threshold limit concentration
TCLP = toxicity characteristic leaching procedure
WET = waste extraction test (22 California Code of Regulations, Section 66261.24)

All concentrations reported in mg/L.
Concentrations in **bold** exceed TCLP Limit.

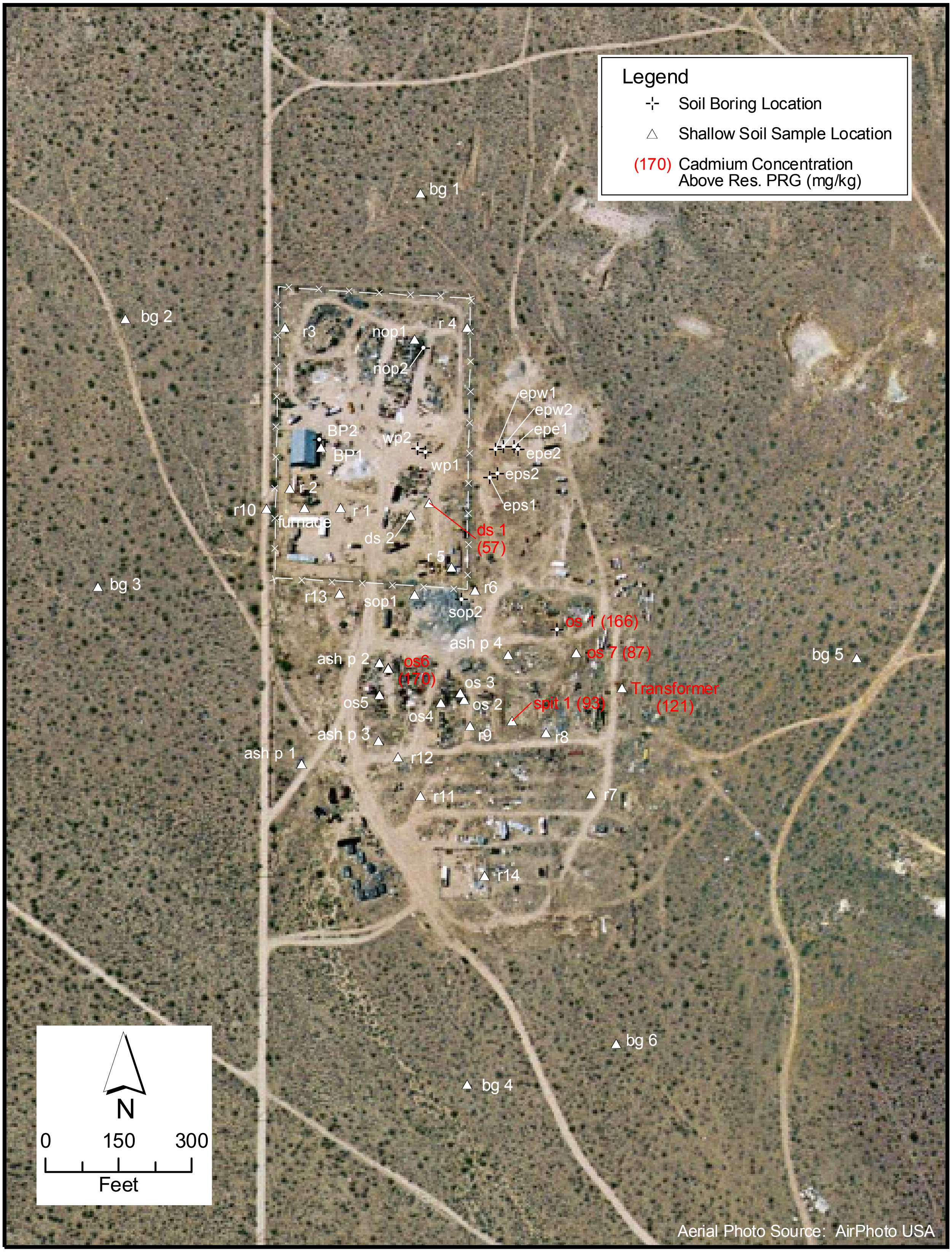

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Figure 2-2. Cadmium Concentrations Above Residential PRGs in Shallow Soil Samples Osage Industries Site, Rosamond, CA

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TABLE 2-3

Dioxins and Furans in Soil Samples
Osage Industries Site
Rosamond, California

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
Furnace	2,3,7,8-TCDD	20.4	1.0	20.4
	1,2,3,7,8-PeCDD	154	1.0	154
(ash sample)	1,2,3,4,7,8-HxCDD	191	0.1	19.1
	1,2,3,6,7,8-HxCDD	327	0.1	32.7
	1,2,3,7,8,9-HxCDD	195	0.1	19.5
	1,2,3,4,6,7,8-HpCDD	2530	0.01	25.3
	OCDD	3950	0.0001	0.395
	2,3,7,8-TCDF	780	0.1	78
	1,2,3,7,8-PeCDF	637	0.05	31.8
	2,3,4,7,8-PeCDF	1550	0.5	777
	1,2,3,4,7,8-HxCDF	1430	0.1	143
	1,2,3,6,7,8-HxCDF	1230	0.1	123
	2,3,4,6,7,8-HxCDF	1730	0.1	173
	1,2,3,7,8,9-HxCDF	781	0.1	78.1
	1,2,3,4,6,7,8-HpCDF	5130	0.01	51.3
	1,2,3,4,7,8,9-HpCDF	898	0.01	8.98
	OCDF	3480	0.0001	0.348
	WHO TEQ			**1,735.9**
DS-1	2,3,7,8-TCDD	64.4	1.0	64.4
	1,2,3,7,8-PeCDD	291	1.0	291
	1,2,3,4,7,8-HxCDD	335	0.1	33.5
	1,2,3,6,7,8-HxCDD	544	0.1	54.4
	1,2,3,7,8,9-HxCDD	308	0.1	30.8
	1,2,3,4,6,7,8-HpCDD	4620	0.01	46.2
	OCDD	9860	0.0001	0.986
	2,3,7,8-TCDF	1740	0.1	174
	1,2,3,7,8-PeCDF	2260	0.05	113
	2,3,4,7,8-PeCDF	1620	0.5	812
	1,2,3,4,7,8-HxCDF	3120	0.1	312
	1,2,3,6,7,8-HxCDF	1580	0.1	158
	2,3,4,6,7,8-HxCDF	1360	0.1	136
	1,2,3,7,8,9-HxCDF	1210	0.1	121
	1,2,3,4,6,7,8-HpCDF	6910	0.01	69.1
	1,2,3,4,7,8,9-HpCDF	2200	0.01	22.0
	OCDF	9430	0.0001	0.943
	WHO TEQ			**2,439.3**

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
DS-2	2,3,7,8-TCDD	9.18	1.0	9.18
	1,2,3,7,8-PeCDD	35.7	1.0	35.7
	1,2,3,4,7,8-HxCDD	37.5	0.1	3.75
	1,2,3,6,7,8-HxCDD	73.5	0.1	7.35
	1,2,3,7,8,9-HxCDD	41	0.1	4.1
	1,2,3,4,6,7,8-HpCDD	598	0.01	5.98
	OCDD	1410	0.0001	0.141
	2,3,7,8-TCDF	102	0.1	10.2
	1,2,3,7,8-PeCDF	145	0.05	7.26
	2,3,4,7,8-PeCDF	96.9	0.5	48.5
	1,2,3,4,7,8-HxCDF	279	0.1	27.9
	1,2,3,6,7,8-HxCDF	138	0.1	13.8
	2,3,4,6,7,8-HxCDF	95.7	0.1	9.57
	1,2,3,7,8,9-HxCDF	60.5	0.1	6.05
	1,2,3,4,6,7,8-HpCDF	756	0.01	7.56
	1,2,3,4,7,8,9-HpCDF	133	0.01	1.33
	OCDF	763	0.0001	0.0763
	WHO TEQ			**198.4**
Ashpile 2	2,3,7,8-TCDD	2280	1.0	2280
	1,2,3,7,8-PeCDD	18600	1.0	18600
(ash sample)	1,2,3,4,7,8-HxCDD	37800	0.1	3780
	1,2,3,6,7,8-HxCDD	64300	0.1	6430
	1,2,3,7,8,9-HxCDD	37900	0.1	3790
	1,2,3,4,6,7,8-HpCDD	689000	0.01	6890
	OCDD	1570000	0.0001	157
	2,3,7,8-TCDF	27500	0.1	2750
	1,2,3,7,8-PeCDF	73200	0.05	3660
	2,3,4,7,8-PeCDF	79700	0.5	39800
	1,2,3,4,7,8-HxCDF	255000	0.1	25500
	1,2,3,6,7,8-HxCDF	139000	0.1	13900
	2,3,4,6,7,8-HxCDF	141000	0.1	14100
	1,2,3,7,8,9-HxCDF	99300	0.1	9930
	1,2,3,4,6,7,8-HpCDF	814000	0.01	8140
	1,2,3,4,7,8,9-HpCDF	218000	0.01	2180
	OCDF	1170000	0.0001	117
	WHO TEQ			**162,004**
Ashpile 2-1.0	2,3,7,8-TCDD	1.36	1.0	1.36
	1,2,3,7,8-PeCDD	9.59	1.0	9.59
(soil beneath)	1,2,3,4,7,8-HxCDD	22.4	0.1	2.24

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,6,7,8-HxCDD	36.5	0.1	3.65
	1,2,3,7,8,9-HxCDD	21.4	0.1	2.14
	1,2,3,4,6,7,8-HpCDD	438	0.01	4.38
	OCDD	976	0.0001	0.0976
	2,3,7,8-TCDF	14.5	0.1	1.45
	1,2,3,7,8-PeCDF	46.3	0.05	2.315
	2,3,4,7,8-PeCDF	31.2	0.5	15.6
	1,2,3,4,7,8-HxCDF	119	0.1	11.9
	1,2,3,6,7,8-HxCDF	82.7	0.1	8.27
	2,3,4,6,7,8-HxCDF	92.8	0.1	9.28
	1,2,3,7,8,9-HxCDF	62.5	0.1	6.25
	1,2,3,4,6,7,8-HpCDF	525	0.01	5.25
	1,2,3,4,7,8,9-HpCDF	148	0.01	1.48
	OCDF	667	0.0001	0.0667
	WHO TEQ			**85.3**
Ashpile 2-surf	2,3,7,8-TCDD	<0.487	1.0	0
	1,2,3,7,8-PeCDD	4.16	1.0	4.16
(soil beneath)	1,2,3,4,7,8-HxCDD	6.57	0.1	0.657
	1,2,3,6,7,8-HxCDD	11.3	0.1	1.13
	1,2,3,7,8,9-HxCDD	6.51	0.1	0.651
	1,2,3,4,6,7,8-HpCDD	133	0.01	1.33
	OCDD	333	0.0001	0.0333
	2,3,7,8-TCDF	7.89	0.1	0.789
	1,2,3,7,8-PeCDF	18.3	0.05	0.917
	2,3,4,7,8-PeCDF	14.6	0.5	7.3
	1,2,3,4,7,8-HxCDF	29.3	0.1	2.93
	1,2,3,6,7,8-HxCDF	31.6	0.1	3.16
	2,3,4,6,7,8-HxCDF	32.6	0.1	3.26
	1,2,3,7,8,9-HxCDF	22.2	0.1	2.22
	1,2,3,4,6,7,8-HpCDF	187	0.01	1.87
	1,2,3,4,7,8,9-HpCDF	45.7	0.01	0.457
	OCDF	213	0.0001	0.0213
	WHO TEQ			**30.9**
Ashpile 1-0.5	2,3,7,8-TCDD	0.53	1.0	0.53
	1,2,3,7,8-PeCDD	2.96	1.0	2.96
(soil beneath)	1,2,3,4,7,8-HxCDD	3.75	0.1	0.375
	1,2,3,6,7,8-HxCDD	6.72	0.1	0.672
	1,2,3,7,8,9-HxCDD	4.47	0.1	0.447
	1,2,3,4,6,7,8-HpCDD	67.2	0.01	0.672
	OCDD	223	0.0001	0.0223

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	2,3,7,8-TCDF	10.6	0.1	1.06
	1,2,3,7,8-PeCDF	13.8	0.05	0.688
	2,3,4,7,8-PeCDF	14.1	0.5	7.03
	1,2,3,4,7,8-HxCDF	26.5	0.1	2.65
	1,2,3,6,7,8-HxCDF	17.2	0.1	1.72
	2,3,4,6,7,8-HxCDF	16.7	0.1	1.67
	1,2,3,7,8,9-HxCDF	8.99	0.1	0.899
	1,2,3,4,6,7,8-HpCDF	92.1	0.01	0.921
	1,2,3,4,7,8,9-HpCDF	20	0.01	0.2
	OCDF	122	0.0001	0.0122
	WHO TEQ			**22.5**
Ashpile 1-1.5	2,3,7,8-TCDD	<0.0760	1.0	0.0
	1,2,3,7,8-PeCDD	<0.0.961	1.0	0.0
(soil beneath)	1,2,3,4,7,8-HxCDD	<0.197	0.1	0.0
	1,2,3,6,7,8-HxCDD	<0.245	0.1	0.0
	1,2,3,7,8,9-HxCDD	<0.212	0.1	0.0
	1,2,3,4,6,7,8-HpCDD	<0.224	0.01	0.0
	OCDD	0.88	0.0001	0.000088
	2,3,7,8-TCDF	<0.0816	0.1	0.0
	1,2,3,7,8-PeCDF	<0.145	0.05	0.0
	2,3,4,7,8-PeCDF	<0.149	0.5	0.0
	1,2,3,4,7,8-HxCDF	<0.0790	0.1	0.0
	1,2,3,6,7,8-HxCDF	<0.0726	0.1	0.0
	2,3,4,6,7,8-HxCDF	<0.0722	0.1	0.0
	1,2,3,7,8,9-HxCDF	<0.0868	0.1	0.0
	1,2,3,4,6,7,8-HpCDF	<0.117	0.01	0.0
	1,2,3,4,7,8,9-HpCDF	<0.122	0.01	0.0
	OCDF	<0.211	0.0001	0.0
	WHO TEQ			0.000088
Ashpile 1-2.0	2,3,7,8-TCDD	<0.125	1.0	0
	1,2,3,7,8-PeCDD	<0.178	1.0	0
(soil beneath)	1,2,3,4,7,8-HxCDD	0.205	0.1	0.0205
	1,2,3,6,7,8-HxCDD	0.318	0.1	0.0318
	1,2,3,7,8,9-HxCDD	0.335	0.1	0.0335
	1,2,3,4,6,7,8-HpCDD	1.73	0.01	0.0173
	OCDD	2.75	0.0001	0.000275
	2,3,7,8-TCDF	<0.145	0.1	0
	1,2,3,7,8-PeCDF	0.360	0.05	0.018
	2,3,4,7,8-PeCDF	<0.158	0.5	0
	1,2,3,4,7,8-HxCDF	0.607	0.1	0.0607

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,6,7,8-HxCDF	0.285	0.1	0.0285
	2,3,4,6,7,8-HxCDF	<0.0945	0.1	0
	1,2,3,7,8,9-HxCDF	<0.108	0.1	0
	1,2,3,4,6,7,8-HpCDF	0.0995	0.01	0.00995
	1,2,3,4,7,8,9-HpCDF	0.339	0.01	0.00339
	OCDF	2.27	0.0001	0.000227
	WHO TEQ			0.2
Ashpile 3	2,3,7,8-TCDD	5170	1.0	5,170
	1,2,3,7,8-PeCDD	118000	1.0	118,000
(ash sample)	1,2,3,4,7,8-HxCDD	443000	0.1	44,300
	1,2,3,6,7,8-HxCDD	735000	0.1	73,500
	1,2,3,7,8,9-HxCDD	397000	0.1	39,700
	1,2,3,4,6,7,8-HpCDD	10300000	0.01	103,000
	OCDD	20300000	0.0001	2,030
	2,3,7,8-TCDF	71200	0.1	7,120
	1,2,3,7,8-PeCDF	274000	0.05	13,700
	2,3,4,7,8-PeCDF	380000	0.5	189,762
	1,2,3,4,7,8-HxCDF	1270000	0.1	127,000
	1,2,3,6,7,8-HxCDF	868000	0.1	86,800
	2,3,4,6,7,8-HxCDF	916000	0.1	91,600
	1,2,3,7,8,9-HxCDF	613000	0.1	61,300
	1,2,3,4,6,7,8-HpCDF	5220000	0.01	52,200
	1,2,3,4,7,8,9-HpCDF	1570000	0.01	15,700
	OCDF	3320000	0.0001	332
	WHO TEQ			**1,031,213.6**
Ashpile 3-surf	2,3,7,8-TCDD	0.709	1.0	0.709
	1,2,3,7,8-PeCDD	1.99	1.0	1.99
(soil beneath)	1,2,3,4,7,8-HxCDD	3.26	0.1	0.326
	1,2,3,6,7,8-HxCDD	5.01	0.1	0.501
	1,2,3,7,8,9-HxCDD	2.96	0.1	0.296
	1,2,3,4,6,7,8-HpCDD	51.2	0.01	0.512
	OCDD	170	0.0001	0.017
	2,3,7,8-TCDF	10.6	0.1	1.06
	1,2,3,7,8-PeCDF	11.8	0.05	0.588
	2,3,4,7,8-PeCDF	7.63	0.5	3.82
	1,2,3,4,7,8-HxCDF	11.9	0.1	1.19
	1,2,3,6,7,8-HxCDF	11.1	0.1	1.11
	2,3,4,6,7,8-HxCDF	9.1	0.1	0.91
	1,2,3,7,8,9-HxCDF	8.09	0.1	0.809
	1,2,3,4,6,7,8-HpCDF	52.1	0.01	0.521

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,4,7,8,9-HpCDF	12.9	0.01	0.129
	OCDF	38.7	0.0001	0.00387
	WHO TEQ			14.5
Ashpile 4	2,3,7,8-TCDD	295	1.0	295
	1,2,3,7,8-PeCDD	3190	1.0	3190
(ash sample)	1,2,3,4,7,8-HxCDD	7270	0.1	727
	1,2,3,6,7,8-HxCDD	12200	0.1	1220
	1,2,3,7,8,9-HxCDD	5760	0.1	576
	1,2,3,4,6,7,8-HpCDD	103000	0.01	1030
	OCDD	183000	0.0001	18
	2,3,7,8-TCDF	9390	0.1	939
	1,2,3,7,8-PeCDF	16600	0.05	828
	2,3,4,7,8-PeCDF	18200	0.5	9,090
	1,2,3,4,7,8-HxCDF	50000	0.1	5,000
	1,2,3,6,7,8-HxCDF	34700	0.1	3,470
	2,3,4,6,7,8-HxCDF	30400	0.1	3,040
	1,2,3,7,8,9-HxCDF	21800	0.1	2,180
	1,2,3,4,6,7,8-HpCDF	182000	0.01	1,820
	1,2,3,4,7,8,9-HpCDF	49700	0.01	497
	OCDF	235000	0.0001	24
	WHO TEQ			**33,944**
BG-1	2,3,7,8-TCDD	<0.102	1.0	0
	1,2,3,7,8-PeCDD	<0.254	1.0	0
	1,2,3,4,7,8-HxCDD	0.577	0.1	0.0577
	1,2,3,6,7,8-HxCDD	0.774	0.1	0.0774
	1,2,3,7,8,9-HxCDD	0.519	0.1	0.0519
	1,2,3,4,6,7,8-HpCDD	8.34	0.01	0.0834
	OCDD	25.9	0.0001	0.00259
	2,3,7,8-TCDF	<0.243	0.1	0
	1,2,3,7,8-PeCDF	0.0698	0.05	0.0349
	2,3,4,7,8-PeCDF	0.0749	0.5	0.375
	1,2,3,4,7,8-HxCDF	1.59	0.1	0.159
	1,2,3,6,7,8-HxCDF	1.18	0.1	0.118
	2,3,4,6,7,8-HxCDF	1.31	0.1	0.131
	1,2,3,7,8,9-HxCDF	1.29	0.1	0.129
	1,2,3,4,6,7,8-HpCDF	7.15	0.01	0.0715
	1,2,3,4,7,8,9-HpCDF	2.18	0.01	0.0218
	OCDF	10.2	0.0001	0.00102
	WHO TEQ			1.3
BG-2	2,3,7,8-TCDD	<0.160	1.0	0

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,7,8-PeCDD	<0.354	1.0	0
	1,2,3,4,7,8-HxCDD	<0.543	0.1	0
	1,2,3,6,7,8-HxCDD	<0.676	0.1	0
	1,2,3,7,8,9-HxCDD	<0.559	0.1	0
	1,2,3,4,6,7,8-HpCDD	1.31	0.01	0.0131
	OCDD	6.61	0.0001	0.000681
	2,3,7,8-TCDF	<0.131	0.1	0
	1,2,3,7,8-PeCDF	<0.287	0.05	0
	2,3,4,7,8-PeCDF	<0.294	0.5	0
	1,2,3,4,7,8-HxCDF	<0.113	0.1	0
	1,2,3,6,7,8-HxCDF	<0.154	0.1	0
	2,3,4,6,7,8-HxCDF	<0.192	0.1	0
	1,2,3,7,8,9-HxCDF	<0.247	0.1	0
	1,2,3,4,6,7,8-HpCDF	<0.307	0.01	0
	1,2,3,4,7,8,9-HpCDF	<0.385	0.01	0
	OCDF	<0.817	0.0001	0
	WHO TEQ			0.0
BG-3	2,3,7,8-TCDD	<0.185	1.0	0
	1,2,3,7,8-PeCDD	<0.370	1.0	0
	1,2,3,4,7,8-HxCDD	<0.478	0.1	0
	1,2,3,6,7,8-HxCDD	<0.550	0.1	0
	1,2,3,7,8,9-HxCDD	<0.455	0.1	0
	1,2,3,4,6,7,8-HpCDD	1.38	0.01	0.0138
	OCDD	7.19	0.0001	0.000719
	2,3,7,8-TCDF	<0.177	0.1	0
	1,2,3,7,8-PeCDF	<0.336	0.05	0
	2,3,4,7,8-PeCDF	<0.337	0.5	0
	1,2,3,4,7,8-HxCDF	<0.120	0.1	0
	1,2,3,6,7,8-HxCDF	<0.162	0.1	0
	2,3,4,6,7,8-HxCDF	<0.184	0.1	0
	1,2,3,7,8,9-HxCDF	<0.221	0.1	0
	1,2,3,4,6,7,8-HpCDF	0.994	0.01	0.00994
	1,2,3,4,7,8,9-HpCDF	<0.173	0.01	0
	OCDF	1.78	0.0001	0.000178
	WHO TEQ	0.224		0.0
BG-4	2,3,7,8-TCDD	<0.121	1.0	0
	1,2,3,7,8-PeCDD	<0.367	1.0	0
	1,2,3,4,7,8-HxCDD	<0.483	0.1	0
	1,2,3,6,7,8-HxCDD	<0.577	0.1	0
	1,2,3,7,8,9-HxCDD	<0.470	0.1	0

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,4,6,7,8-HpCDD	0.717	0.01	0.00717
	OCDD	2.93	0.0001	0.000293
	2,3,7,8-TCDF	<0.0877	0.1	0
	1,2,3,7,8-PeCDF	<0.204	0.05	0
	2,3,4,7,8-PeCDF	<0.207	0.5	0
	1,2,3,4,7,8-HxCDF	<0.11	0.1	0
	1,2,3,6,7,8-HxCDF	<0.156	0.1	0
	2,3,4,6,7,8-HxCDF	<0.175	0.1	0
	1,2,3,7,8,9-HxCDF	<0.212	0.1	0
	1,2,3,4,6,7,8-HpCDF	0.421	0.01	0.00421
	1,2,3,4,7,8,9-HpCDF	<0.139	0.01	0
	OCDF	<0.564	0.0001	0
	WHO TEQ			0.0
BG-5	2,3,7,8-TCDD	<0.173	1.0	0
	1,2,3,7,8-PeCDD	<0.349	1.0	0
	1,2,3,4,7,8-HxCDD	0.526	0.1	0.0526
	1,2,3,6,7,8-HxCDD	1.02	0.1	0.102
	1,2,3,7,8,9-HxCDD	0.511	0.1	0.0511
	1,2,3,4,6,7,8-HpCDD	5.27	0.01	0.0527
	OCDD	13.2	0.0001	0.00132
	2,3,7,8-TCDF	1.11	0.1	0.111
	1,2,3,7,8-PeCDF	2.090	0.05	0.104
	2,3,4,7,8-PeCDF	1.75	0.5	0.875
	1,2,3,4,7,8-HxCDF	2.4	0.1	0.24
	1,2,3,6,7,8-HxCDF	1.65	0.1	0.165
	2,3,4,6,7,8-HxCDF	1.36	0.1	0.136
	1,2,3,7,8,9-HxCDF	1.36	0.1	0.136
	1,2,3,4,6,7,8-HpCDF	5.57	0.01	0.0557
	1,2,3,4,7,8,9-HpCDF	1.68	0.01	0.0158
	OCDF	6.79	0.0001	0.000679
	WHO TEQ			2.1
BG-6	2,3,7,8-TCDD	1.48	1.0	1.48
	1,2,3,7,8-PeCDD	18.6	1.0	18.6
	1,2,3,4,7,8-HxCDD	67.4	0.1	6.74
	1,2,3,6,7,8-HxCDD	108	0.1	10.8
	1,2,3,7,8,9-HxCDD	68.2	0.1	6.82
	1,2,3,4,6,7,8-HpCDD	1540	0.01	15.4
	OCDD	3760	0.0001	0.376
	2,3,7,8-TCDF	9.15	0.1	0.915
	1,2,3,7,8-PeCDF	48.000	0.05	2.4

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	2,3,4,7,8-PeCDF	46.4	0.5	23.2
	1,2,3,4,7,8-HxCDF	68.4	0.1	6.84
	1,2,3,6,7,8-HxCDF	50.1	0.1	5.01
	2,3,4,6,7,8-HxCDF	143	0.1	14.3
	1,2,3,7,8,9-HxCDF	97.5	0.1	9.75
	1,2,3,4,6,7,8-HpCDF	303	0.01	3.03
	1,2,3,4,7,8,9-HpCDF	211	0.01	2.11
	OCDF	713	0.0001	0.0713
	WHO TEQ			**127.8**
R 6	2,3,7,8-TCDD	3.96	1.0	3.96
	1,2,3,7,8-PeCDD	8.25	1.0	8.25
	1,2,3,4,7,8-HxCDD	8.18	0.1	0.818
	1,2,3,6,7,8-HxCDD	14.4	0.1	1.44
	1,2,3,7,8,9-HxCDD	7.97	0.1	0.797
	1,2,3,4,6,7,8-HpCDD	130	0.01	1.3
	OCDD	351	0.0001	0.0351
	2,3,7,8-TCDF	22.8	0.1	2.28
	1,2,3,7,8-PeCDF	33.6	0.05	1.68
	2,3,4,7,8-PeCDF	17.8	0.5	8.9
	1,2,3,4,7,8-HxCDF	50.8	0.1	5.08
	1,2,3,6,7,8-HxCDF	31.1	0.1	3.11
	2,3,4,6,7,8-HxCDF	22.8	0.1	2.28
	1,2,3,7,8,9-HxCDF	17.7	0.1	1.77
	1,2,3,4,6,7,8-HpCDF	165	0.01	1.65
	1,2,3,4,7,8,9-HpCDF	46.2	0.01	0.462
	OCDF	240	0.0001	0.024
	WHO TEQ			**43.8**
R 7	2,3,7,8-TCDD	0.621	1.0	0.621
	1,2,3,7,8-PeCDD	1.55	1.0	1.55
	1,2,3,4,7,8-HxCDD	2.4	0.1	0.24
	1,2,3,6,7,8-HxCDD	3.67	0.1	0.367
	1,2,3,7,8,9-HxCDD	1.67	0.1	0.167
	1,2,3,4,6,7,8-HpCDD	22	0.01	0.22
	OCDD	75.1	0.0001	0.00751
	2,3,7,8-TCDF	8.47	0.1	0.847
	1,2,3,7,8-PeCDF	13.900	0.05	0.695
	2,3,4,7,8-PeCDF	6.41	0.5	3.205
	1,2,3,4,7,8-HxCDF	16.1	0.1	1.61
	1,2,3,6,7,8-HxCDF	9.48	0.1	0.948
	2,3,4,6,7,8-HxCDF	6.63	0.1	0.663

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,7,8,9-HxCDF	6.28	0.1	0.628
	1,2,3,4,6,7,8-HpCDF	38.5	0.01	0.385
	1,2,3,4,7,8,9-HpCDF	13.5	0.01	0.135
	OCDF	53.9	0.0001	0.00539
	WHO TEQ			12.3
R 8	2,3,7,8-TCDD	1.27	1.0	1.27
	1,2,3,7,8-PeCDD	6.35	1.0	6.35
	1,2,3,4,7,8-HxCDD	9.84	0.1	0.984
	1,2,3,6,7,8-HxCDD	15.6	0.1	1.56
	1,2,3,7,8,9-HxCDD	8.36	0.1	0.836
	1,2,3,4,6,7,8-HpCDD	137	0.01	1.37
	OCDD	420	0.0001	0.042
	2,3,7,8-TCDF	30.5	0.1	3.05
	1,2,3,7,8-PeCDF	44.700	0.05	2.235
	2,3,4,7,8-PeCDF	26.5	0.5	13.25
	1,2,3,4,7,8-HxCDF	66.9	0.1	6.69
	1,2,3,6,7,8-HxCDF	39.7	0.1	3.97
	2,3,4,6,7,8-HxCDF	32.5	0.1	3.25
	1,2,3,7,8,9-HxCDF	25.8	0.1	2.58
	1,2,3,4,6,7,8-HpCDF	200	0.01	2
	1,2,3,4,7,8,9-HpCDF	53.8	0.01	0.538
	OCDF	213	0.0001	0.0213
	WHO TEQ			**50.0**
R 9	2,3,7,8-TCDD	3.77	1.0	3.77
	1,2,3,7,8-PeCDD	24.2	1.0	24.2
	1,2,3,4,7,8-HxCDD	35.2	0.1	3.52
	1,2,3,6,7,8-HxCDD	63	0.1	6.3
	1,2,3,7,8,9-HxCDD	31.3	0.1	3.13
	1,2,3,4,6,7,8-HpCDD	376	0.01	3.76
	OCDD	1600	0.0001	0.16
	2,3,7,8-TCDF	88.1	0.1	8.81
	1,2,3,7,8-PeCDF	133	0.05	6.65
	2,3,4,7,8-PeCDF	79.6	0.5	39.8
	1,2,3,4,7,8-HxCDF	254	0.1	25.4
	1,2,3,6,7,8-HxCDF	158	0.1	15.8
	2,3,4,6,7,8-HxCDF	109	0.1	10.9
	1,2,3,7,8,9-HxCDF	68.9	0.1	6.89
	1,2,3,4,6,7,8-HpCDF	1260	0.01	12.6
	1,2,3,4,7,8,9-HpCDF	185	0.01	1.85
	OCDF	1150	0.0001	0.115

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	WHO TEQ			**173.7**
R 10	2,3,7,8-TCDD	<0.246	1.0	<0.246
	1,2,3,7,8-PeCDD	2.13	1.0	2.13
	1,2,3,4,7,8-HxCDD	4.91	0.1	0.491
	1,2,3,6,7,8-HxCDD	27.3	0.1	2.73
	1,2,3,7,8,9-HxCDD	9.15	0.1	0.915
	1,2,3,4,6,7,8-HpCDD	394	0.01	3.94
	OCDD	4080	0.0001	0.408
	2,3,7,8-TCDF	1.7	0.1	0.17
	1,2,3,7,8-PeCDF	2.04	0.05	0.102
	2,3,4,7,8-PeCDF	1.52	0.5	0.76
	1,2,3,4,7,8-HxCDF	6.31	0.1	0.631
	1,2,3,6,7,8-HxCDF	3.89	0.1	0.389
	2,3,4,6,7,8-HxCDF	4.72	0.1	0.472
	1,2,3,7,8,9-HxCDF	2.16	0.1	0.216
	1,2,3,4,6,7,8-HpCDF	104	0.01	1.04
	1,2,3,4,7,8,9-HpCDF	16	0.01	0.16
	OCDF	560	0.0001	0.056
	WHO TEQ			14.6
R 11	2,3,7,8-TCDD	1.67	1.0	1.67
	1,2,3,7,8-PeCDD	9.33	1.0	9.33
	1,2,3,4,7,8-HxCDD	14.5	0.1	1.45
	1,2,3,6,7,8-HxCDD	22.7	0.1	2.27
	1,2,3,7,8,9-HxCDD	12.3	0.1	1.23
	1,2,3,4,6,7,8-HpCDD	197	0.01	1.97
	OCDD	424	0.0001	0.0424
	2,3,7,8-TCDF	48.2	0.1	4.82
	1,2,3,7,8-PeCDF	61.700	0.05	3.085
	2,3,4,7,8-PeCDF	43.9	0.5	21.95
	1,2,3,4,7,8-HxCDF	90.1	0.1	9.01
	1,2,3,6,7,8-HxCDF	55.3	0.1	5.53
	2,3,4,6,7,8-HxCDF	48.5	0.1	4.85
	1,2,3,7,8,9-HxCDF	35.8	0.1	3.58
	1,2,3,4,6,7,8-HpCDF	262	0.01	2.62
	1,2,3,4,7,8,9-HpCDF	67.1	0.01	0.671
	OCDF	246	0.0001	0.0246
	WHO TEQ			**74.1**
R 12	2,3,7,8-TCDD	8.53	1.0	8.53
	1,2,3,7,8-PeCDD	43.9	1.0	43.9
	1,2,3,4,7,8-HxCDD	67.4	0.1	6.74

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,6,7,8-HxCDD	100	0.1	10
	1,2,3,7,8,9-HxCDD	59.6	0.1	5.96
	1,2,3,4,6,7,8-HpCDD	763	0.01	7.63
	OCDD	2140	0.0001	0.214
	2,3,7,8-TCDF	122	0.1	12.2
	1,2,3,7,8-PeCDF	216	0.05	10.8
	2,3,4,7,8-PeCDF	118	0.5	59
	1,2,3,4,7,8-HxCDF	364	0.1	36.4
	1,2,3,6,7,8-HxCDF	218	0.1	21.8
	2,3,4,6,7,8-HxCDF	158	0.1	15.8
	1,2,3,7,8,9-HxCDF	129	0.1	12.9
	1,2,3,4,6,7,8-HpCDF	1170	0.01	11.7
	1,2,3,4,7,8,9-HpCDF	314	0.01	3.14
	OCDF	1330	0.0001	0.133
	WHO TEQ			**266.8**
R 13	2,3,7,8-TCDD	1.25	1.0	1.25
	1,2,3,7,8-PeCDD	5.8	1.0	5.8
	1,2,3,4,7,8-HxCDD	7.78	0.1	0.778
	1,2,3,6,7,8-HxCDD	16.1	0.1	1.61
	1,2,3,7,8,9-HxCDD	8.64	0.1	0.864
	1,2,3,4,6,7,8-HpCDD	120	0.01	1.2
	OCDD	789	0.0001	0.0789
	2,3,7,8-TCDF	24.5	0.1	2.45
	1,2,3,7,8-PeCDF	31.800	0.05	1.59
	2,3,4,7,8-PeCDF	20.6	0.5	10.3
	1,2,3,4,7,8-HxCDF	47.9	0.1	4.79
	1,2,3,6,7,8-HxCDF	32.6	0.1	3.26
	2,3,4,6,7,8-HxCDF	30	0.1	3
	1,2,3,7,8,9-HxCDF	18.7	0.1	1.87
	1,2,3,4,6,7,8-HpCDF	165	0.01	1.65
	1,2,3,4,7,8,9-HpCDF	43.5	0.01	0.435
	OCDF	195	0.0001	0.0195
	WHO TEQ			**40.9**
R 14	2,3,7,8-TCDD	<0.239	1.0	<0.239
	1,2,3,7,8-PeCDD	1.16	1.0	1.16
	1,2,3,4,7,8-HxCDD	1.9	0.1	0.19
	1,2,3,6,7,8-HxCDD	3.04	0.1	0.304
	1,2,3,7,8,9-HxCDD	1.72	0.1	0.172
	1,2,3,4,6,7,8-HpCDD	27.4	0.01	0.274
	OCDD	94.7	0.0001	0.00947

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	2,3,7,8-TCDF	3.57	0.1	0.357
	1,2,3,7,8-PeCDF	5.98	0.05	0.299
	2,3,4,7,8-PeCDF	3.09	0.5	1.545
	1,2,3,4,7,8-HxCDF	9.64	0.1	0.964
	1,2,3,6,7,8-HxCDF	6.16	0.1	0.616
	2,3,4,6,7,8-HxCDF	5.31	0.1	0.531
	1,2,3,7,8,9-HxCDF	4.07	0.1	0.407
	1,2,3,4,6,7,8-HpCDF	31.3	0.01	0.313
	1,2,3,4,7,8,9-HpCDF	9.42	0.01	0.0942
	OCDF	40.5	0.0001	0.00405
	WHO TEQ			7.2
4 pt comp	2,3,7,8-TCDD	1970	1.0	1970
Drums	1,2,3,7,8-PeCDD	24000	1.0	24000
	1,2,3,4,7,8-HxCDD	36900	0.1	3690
(ash sample)	1,2,3,6,7,8-HxCDD	82000	0.1	8200
	1,2,3,7,8,9-HxCDD	31700	0.1	3170
	1,2,3,4,6,7,8-HpCDD	778000	0.01	7780
	OCDD	1810000	0.0001	181
	2,3,7,8-TCDF	127000	0.1	12700
	1,2,3,7,8-PeCDF	169000	0.05	8470
	2,3,4,7,8-PeCDF	142000	0.5	71000
	1,2,3,4,7,8-HxCDF	264000	0.1	26400
	1,2,3,6,7,8-HxCDF	271000	0.1	27100
	2,3,4,6,7,8-HxCDF	281000	0.1	28100
	1,2,3,7,8,9-HxCDF	219000	0.1	21900
	1,2,3,4,6,7,8-HpCDF	1500000	0.01	15000
	1,2,3,4,7,8,9-HpCDF	1160000	0.01	3970
	OCDF		0.0001	116
	WHO TEQ			**263,747**
4 pt comp	2,3,7,8-TCDD	<0.436	1.0	0
Bin	1,2,3,7,8-PeCDD	2.19	1.0	2.19
	1,2,3,4,7,8-HxCDD	2.87	0.1	0.287
	1,2,3,6,7,8-HxCDD	5.65	0.1	0.565
	1,2,3,7,8,9-HxCDD	3.11	0.1	0.311
	1,2,3,4,6,7,8-HpCDD	60.5	0.01	0.605
	OCDD	315	0.0001	0.0315
	2,3,7,8-TCDF	6.57	0.1	0.657
	1,2,3,7,8-PeCDF	9.09	0.05	0.454
	2,3,4,7,8-PeCDF	5.93	0.5	2.97
	1,2,3,4,7,8-HxCDF	11.0	0.1	1.1

TABLE 2-3

(Continued)

Sample ID	Analyte	Concentration (pg/g)	TEF	WHO Toxicity (pg/g)
	1,2,3,6,7,8-HxCDF	12.4	0.1	1.24
	2,3,4,6,7,8-HxCDF	11.7	0.1	1.17
	1,2,3,7,8,9-HxCDF	7.91	0.1	0.791
	1,2,3,4,6,7,8-HpCDF	69.1	0.01	0.691
	1,2,3,4,7,8,9-HpCDF	16.3	0.01	0.163
	OCDF	81.7	0.0001	0.00817
	WHO TEQ			13.2

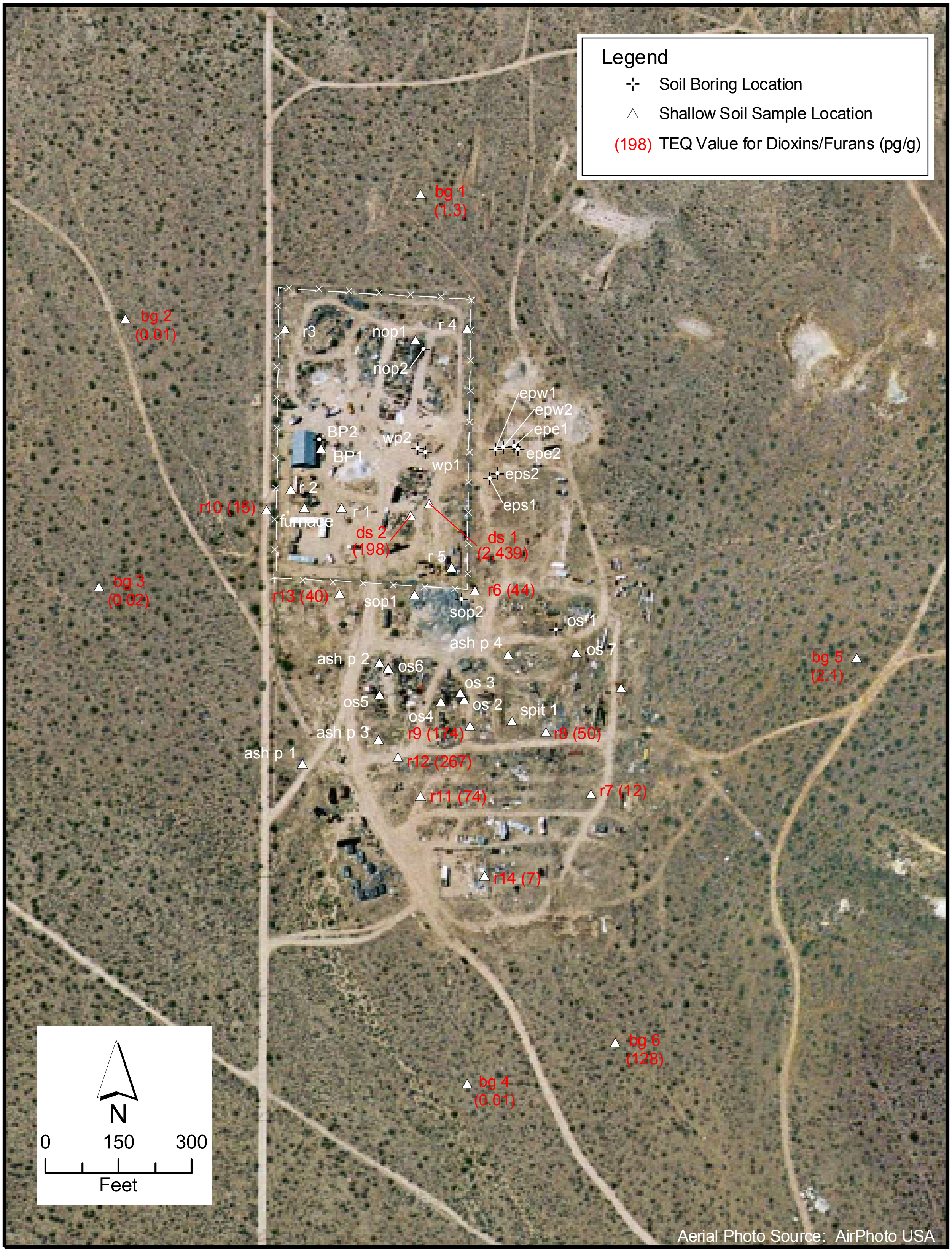
Hp CDD = heptachlorodibenzo-p-dioxin
OCDF = octachlorodibenzo-furan
Hp CDF = heptachlorodibenzo-furan
Hx CDD = hexachlorodibenzo-p-dioxin
OCDF = octachlorodibenzo-furan
Hx CDF = hexachlorodibenzo-furan
Ind. PRG (TEQ) = EPA preliminary remediation goal TEQ value for soils at industrial sites is 16 pg/g
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzo-furan
Pe CDD = pentachlorodibenzo-p-dioxin
Pe CDF = pentachlorodibenzo-furan
pg/g = picograms per gram
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzo-furan
TEF = toxicity equivalency factor
WHO = World Health Organization
WHO TEQ = toxic equivalency quotient determined using method established by the WHO

WHO TEQ values in **bold** exceed the Ind. PRG TEQ value (16 pg/g).

These data suggest that the source of dioxins/furans in surface soils at the site (discussed hereafter) is the ash that was generated during historical ore smelting and metals recovery activities conducted within the furnace. Additional sealed drums of ash are present in the vicinity of the ash piles. The ash piles and the drums were containerized on August 31, 2004, to prevent additional airborne spreading of these contaminants.

2.2.5.2 Site Soil Samples

Soil samples were collected with a hand auger from 2 feet beneath ash pile 1 and from 1 foot beneath ash pile 2. Results of these analyses are presented in Table 2-3. Concentrations of dioxins/furans in these samples were as much as four orders of magnitude lower than in the ash piles above them. The reported TEQ value for sample ash pile 2 at 1.0 ft bgs was 85.3 pg/g. Confirmation soil samples were collected beneath ash pile 2 and ash pile 3 after the piles were excavated and containerized. The dioxin/furan TEQ values for these samples were 30.9 pg/g and 14.5 pg/g, respectively (Table 2-3).



F:\Projects\DTSC\Osage\ArcMaps\Osage_TEQ.mxd LCT 08.25.05 SAC

Figure 2-3. Dioxin/Furan TEQ Values for Shallow Soil Samples
Osage Industries Site, Rosamond, CA

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It is assumed that some of the contaminated ash was released into the air from the furnace while the ash was being produced. It is likely that this ash would have been carried downwind (east-southeast) and then deposited on the ground surface. In addition, ash from the existing ash piles could have been picked up and redistributed downwind during periods of high velocity wind at the site.

Surface soil samples were collected from two small areas of dark-stained (DS) soil in the southeastern portion of the site and analyzed for dioxins and furans. Analyses of both of these samples reported levels for dioxins/furans that were well above the industrial PRG of 16 pg/g (Figure 2-3). Sample DS-1 had a calculated TEQ value of 2,439 pg/g, and sample DS-2 had a calculated TEQ value of 198 pg/g.

Random samples R6 through R14 were collected from random locations throughout the southern portion of the site to assess the lateral extent of shallow soil contamination. As shown on Figure 2-3, the reported TEQ values for these samples ranged from 7 pg/g in the southernmost sample (R14) to 267 pg/g in sample R12, collected 200 feet south of ash pile 2 and 200 feet east of ash pile 1. Generally, the highest dioxin/furan concentrations were reported in samples collected near to and downwind (east-southeast) from the furnace and ash piles. Samples R7 and R14, collected at the southeastern edge of the site approximately 400 feet from the nearest ash pile, reported TEQ values below the industrial PRG.

2.2.5.3 Background Soil Samples

The six background samples that were collected from surface soil surrounding the site were analyzed for dioxins/furans to determine whether off-site soils were impacted by airborne dioxins/furans from the site. Analysis of background sample BG-6, one of the background samples collected downwind from (southeast of) the site, reported elevated dioxin concentrations, with a TEQ of 128 pg/g. This value is eight times greater than the industrial PRG value of 16 pg/g. The other five background samples reported dioxin concentrations below the industrial PRG, with TEQ values ranging from 0.012 pg/g in BG-4 to 2.10 pg/g in BG-5.

These data suggest that the ash produced at the on-site furnace and ash piles in the southern portion of the site was transported downwind and has resulted in an area of dioxin-contaminated surface soil that extends from the furnace toward the east-southeast.

2.3 ON-SITE DOMESTIC WELL SAMPLING

The grab groundwater samples collected from the on-site residential water supply well (with a depth to water of 34 feet bgs) were analyzed for TPH-d, CAM 17 metals, general minerals, cyanide, fluoride, PCBs, and PAHs. TPH, PCBs, PAHs, and cyanide were not detected in the sample. Chloride (580 mg/L), sulfate (340 mg/L), fluoride (1.3 mg/L), and several metals were detected in the groundwater sample. Each was reported below the primary MCL (PMCL). However, lead was reported at 0.0221 mg/L, which is slightly above the action level of 0.015 mg/L established for lead. However, on January 3, 2006, another grab groundwater sample was collected and analyzed for CAM 17 metals. This round of sampling indicated lead concentration to be at 0.0103 mg/L, which is well below the action level mentioned above. No other metals were shown to be above their respectable action levels from the groundwater sample taken on January 2006.

Although the groundwater sample was not analyzed for dioxins/furans, it is unlikely that site groundwater has been impacted with these compounds, given the limited mobility of dioxins/furans in an extremely arid environment and the moderate depth to groundwater (34 to 36 feet bgs).

2.4 BASELINE HUMAN HEALTH RISK ASSESSMENT

This section summarizes the results of the human HRA, which was described in Section 4.0 of the RI report (URS Group, Inc., 2005). The HRA was prepared using the analytical data gathered during RI sampling activities at the site to characterize site-related contamination in soils and groundwater. As summarized in Section 3.3 of this RAWP, TPH-d, PCBs, PAHs, and cyanide were not detected in groundwater samples in the on-site domestic water supply well. Although metals and inorganic elements, other than lead, detected in groundwater samples were below their respective PMCLs, they were carried through the HRA.

The HRA provides a quantitative and qualitative analysis of the potential human health risks for those receptors exposed to the contaminants of potential concern (COPCs) detected in site soils. The receptors considered in the HRA are those that could be present at the site under reasonably anticipated future land-use scenarios (e.g., commercial, industrial, residential) and those receptors that could use impacted groundwater as an untreated source of potable water. This HRA reflects baseline conditions that would be present if no further action were taken to deal with the site-related soil and groundwater contaminants. This baseline HRA was conducted to estimate the potential cancer risks and adverse noncarcinogenic health effects resulting from exposure to site-related contaminants in the absence of any removal actions, other than institutional controls at the site.

2.4.1 HRA Summary

The site has been impacted by dioxins/furans and several inorganic contaminants as the result of historic operations. The HRA evaluated the potential human health risks associated with exposure to the site-related contamination in soils, groundwater, and, indirectly, in air. Elevated concentrations of dioxins/furans, arsenic, and cadmium were reported in samples collected from on-site soils and the on-site supply well. The data were then used to develop statistical estimates of exposure point concentrations (EPCs) for all COPCs detected in site media. Human health risks to existing or hypothetical future on-site receptors (residents and occupational and construction workers) associated with exposure to all COPCs in the affected media were then estimated for potential cancer risks and adverse noncarcinogenic health effects (see Table 2-4).

2.4.1.1 On-Site Soils and Homegrown Produce Pathways

The following COPCs or COCs were found to drive the estimated cumulative risk of 1.6E-03 for the hypothetical future resident, the most sensitive potential receptor, exposed to site soils.

- Dioxins/furans (as 2,3,7,8-TCDD eq.), at a soil EPC of 4.55E-04, resulted in estimated risks of 1E-04 for exposure through incidental ingestion and dermal contact with soil and of 2.5E-04 through the consumption of homegrown produce.
- Arsenic, at a soil EPC of 8.02 mg/kg, resulted in estimated risks of 2E-05 for exposure through incidental ingestion and dermal contact with soil and 6E-05 through the consumption of homegrown produce.

TABLE 2-4

Human Health Risk Assessment Summary
Osage Industries Site
Rosamond, California

Chemical	On-Site Resident (adult and child)		On-Site Occupational Worker		On-Site Construction Worker	
	Cancer Risk	**Noncarcinogenic Health Hazard (HQ)**	**Cancer Risk**	**Noncarcinogenic Health Hazard (HQ)**	**Cancer Risk**	**Noncarcinogenic Health Hazard (HQ)**
METALS/INORGANIC CHEMICALS						
Antimony	NC	0.3	NC	0.01	NC	0.001
Arsenic	**8.4-05**	1	**2.9E-06**	0.02	8E-07	0.01
Barium	NC	0.6	NC	0.001	NC	3E-04
Beryllium	3E-12	0.1	1E-12	0.001	5E-14	3E-04
Cadmium	**1.1E-03**	**14**	**2.2E-06**	0.02	8E-07	0.002
Chromium (total)	NC	4E-04	NC	7E-06	NC	2E-06
Chromium VI[a]	8E-11	0.03	4E-11	4E-04	2E-12	6E-05
Cobalt	5E-12	0.01	3E-12	3E-04	1E-13	6E-05
Copper	NC	0.4	NC	4E-03	NC	0.001
Lead[b]	9.0 µg/dl (adult) 23 µg/dl (child)		5.4 µg/dl		12.7 µg/dl	
Mercury	NC	0.05	NC	4E-04	NC	9E-05
Molybdenum	NC	1	NC	0.001	NC	2E-04
Nickel	2E-12	0.9	8E-13	0.001	3E-14	2E-04
Selenium	NC	0.03	NC	1E-04	NC	3E-05
Silver	NC	0.3	NC	0.005	NC	0.001
Zinc	NC	**4**	NC	0.002	NC	4E-04
NON-VOLATILE ORGANIC COMPOUNDS						
PCDDs and PCDFs (Dioxins/Furans)[c]	**3.5E-04**	**2**	**1.4E-05**	0.03	4.1E-06	0.01
Indeno(1,2,3-c,d)pyrene	9.5E-07	NA	7E-08	NA	1E-08	NA
Totals	**1.6E-03**	**24**	**2.0E-05**	0.09	**5.8E-06**	0.03

[a] Hexavalent chromium (chromium VI) concentration based on 1/7 of total chromium.
[b] Lead hazards based on 99th percentile blood-lead levels (see DTSC's Leadspread Spreadsheets in Appendix F in the URS RI Report [URS, 2005]). Residential child: 23 µg/dl; residential adult: 9 µg/dl; on site occupational worker: 5.4 µg/dl; on site construction worker: 12.7 µg/dl.
[c] PCDD and PCDF congeners evaluated as toxicity equivalents (TEQs) of 2,3,7,8-tetrachlorodibenzo-p-dioxin, based on World Health Organization toxicity equivalency factors (TEFs).

Constituents and risk values in **bold** exceed risk or hazard benchmarks of 1E-6 and 1.0, respectively, and/or are considered risk drivers.

DTSC = Department of Toxic Substances Control
HQ = hazard quotient
NA = not applicable, not available, or not analyzed
NC = noncarcinogenic (not classified or evaluated as a known, probable or possible human carcinogen)
PCDD = polychlorinated dibenzo-p-dioxin
PCDF = polychlorinated dibenzofuran
µg/dl = micrograms per deciliter

- Cadmium, at a soil EPC of 32.7 mg/kg, resulted in estimated risks of 2E-05 for exposure through incidental ingestion and dermal contact with soil and 1E-03 through the consumption of homegrown produce.
- Lead, at a soil EPC of 453 mg/kg, resulted in estimated 99^{th} percentile blood-lead levels for the exposed residential child of 15.6 micrograms per deciliter (μg/dl) (without homegrown produce) and 23 μg/dl (with homegrown produce pathway contribution) and a 99^{th} percentile blood-lead level of 12.7 μg/dl for the on site construction worker.

Cadmium (2E-06), arsenic (3E-06), and dioxins/furans (1E-05) also were the risk drivers for the on-site occupational worker's cumulative risk of 2E-05. Dioxins/furans (4E-06) were the risk drivers for the cumulative risk of 6E-06 for the hypothetical construction worker.

The potential for noncarcinogenic health effects for the residential child were indicated based on the cumulative hazard index (HI) value of 24, principally as a result of exposure to cadmium through the ingestion of homegrown produce (HQ = 14). The other COCs contributing to the potential for adverse health effects are dioxins/furans (HQ = 1.5). Exposure to lead in site soils (0 to 2 feet bgs) could result in elevated blood-lead levels exceeding the 10 μg/dl level of concern in the residential child (15.6 μg/dl to 23 μg/dl) and the on-site construction worker (12.7 μg/dl). As discussed in the HRA, large uncertainties are associated with the estimated risks for the homegrown produce pathway, including the potential unreliability of the plant/soil partition coefficients used to calculate COPC EPCs. Consequently, the risk characterization for this pathway must be considered with those uncertainties in mind.

2.4.1.2 Groundwater Pathway

Although the completeness of this pathway may be subject to some question, all appropriate exposure routes (ingestion and dermal contact during bathing/showering) were considered as part of the residential-use scenario. It was assumed that untreated groundwater from the on-site well would be used as a potable drinking and household water source. Since none of the contaminants detected in the groundwater sample are considered known, probable, or possible human carcinogens, no cancer risks were associated with residential exposure to the groundwater. Furthermore, as discussed, the only COPC that posed a potential for an adverse noncarcinogenic health effect for the exposed residential child was zinc (HQ = 2.9). Zinc, as discussed, was detected in the groundwater sample at a concentration of 1.78 mg/L, which is well below the California secondary MCL of 5.0 mg/L established to address the taste, odor, or appearance of drinking water (Title 22 California Code of Regulations [CCR] §64449). Nevertheless, based on the groundwater pathway HQ value of 5.5, use of this water as a source of drinking water or for household purposes may pose a potential for adverse health effects.

2.4.2 Conclusions and Recommendations

Elevated concentrations of dioxins/furans, arsenic, and cadmium were reported in samples collected from on-site soils. Lead concentrations were reported slightly above the California drinking water action level (22 CCR 64672.3) in the groundwater sample collected from the on-site domestic well. The analytical data were used to statistically estimate EPCs for all COPCs detected in site media. Human health risks to existing or hypothetical future on-site receptors (residents and occupational and construction workers) associated with exposure to all COPCs in the affected media were then estimated for potential cancer risks and adverse non-carcinogenic health effects. Based on continued health risks indicated by the results of the risk assessment, limited excavation of ‘hot spots’ and on-site containment of contaminated soil and ash was conducted. Based on the HRA findings, the RI recommended additional removal action to address the contaminated soil and ash in surface soil that was not contained.

2.4.2.1 Soil Investigation

Conclusions

The following samples were analyzed for dioxins/furans: 12 surface soil samples, 2 deeper soil samples, 4 ash samples, 6 background samples, and 2 composite samples from containerized material. The EPA Region 9 industrial soil PRG of 1.6E-05 for dioxins/furans was exceeded for all 5 of the ash samples, in 9 of the 12 surface soil samples collected from the southern portion of the facility, and in 1 of the background samples (BG 6) that was collected southeast of the furnace and ash piles. Samples of the ash contained dioxin/furan levels up to 64,000 times the industrial soil PRG. Shallow soil contaminated with dioxins extends off site to the southeast, the dominant downwind direction. Limited excavation and temporary on-site containment of ash deposits has been conducted to prevent further airborne distribution of the dioxin/furan contaminants.

Title 22 metals, including antimony, cadmium, lead, and zinc, were reported above the respective industrial soil PRG concentrations. Results of WET analyses indicated that several samples had concentrations of leachable metals above their STLCs [22CCR 66261.24(a)(2)(a)]. However, results of analyses from deeper samples indicate that metals impacts are limited to near-surface soils and do not extend below 1 foot bgs.

The soil analytical results generally achieved the investigation objective of assessing the extent of soil contamination. The vertical extent of metal and dioxin/furan concentrations above industrial soil PRGs is generally less than 1 foot bgs. The lateral extent of metals soil contamination is assumed to be limited to the footprint of the specific feature the impacted samples were intended to investigate. Dioxin/furan contamination in shallow soil is the result of an airborne plume of ash that extended from the furnace and ash piles toward the southeast.

Human health risks for soil contaminants at the site were estimated for the hypothetical future on-site resident, on-site occupational worker, and on-site construction worker. These risks are summarized in Table 2-4. Cadmium, arsenic, and dioxins/furans were the risk drivers for all potential receptors. For an industrial land-use scenario in which the on-site occupational worker would be the receptor, the excess cancer risks from cadmium (2E-06), arsenic (3E-06), and dioxins/furans (1E-05) produced a cumulative risk of 2E-05. These risks were calculated based on the assumption that the existing ash piles at the site would be removed.

HRA Recommendations

Based on the HRA findings, excavation and disposal of the remaining contaminated ash deposits and soil were recommended in the RI report, along with confirmation soil sampling and analyses to guide the excavation activities. In addition, the RI recommended that land-use controls for the site and the area southeast of the site should be emplaced to prevent development/construction on soil impacted with dioxins/furans.

2.4.2.2 On-Site Domestic Well Sampling

Conclusions

Analysis of the groundwater grab samples collected from the on-site domestic well indicated that sulfate, chloride, fluoride, and six CAM 17 metals, including lead, are present in the groundwater at the site. Although the lead concentration in one of the sampling event slightly exceeded the drinking water action level, the results of the HRA indicated that the groundwater in this portion of the site probably was not impacted to the point of posing a health risk.

The human HRA indicated that the residential child's HI value of 5.5, associated with simultaneous exposure to the six multiple inorganic COPCs, may indicate a potential for adverse health effects, particularly as a result of exposure to zinc (HQ = 2.9). However, no excess cancer risks result from the constituents reported in the on-site well. Since the recommended land use for the site is industrial, the residential child scenario is purely hypothetical and does not represent current (or future) uses of the site or well.

Recommendations

The RI recommended that the on-site domestic well be sampled and analyzed for metals in order to determine trends in dissolved metals concentrations, primarily for lead and zinc. Two rounds of sampling have been collected so far, and it is desirable that one or two more samples be collected from the on-site domestic well. However, since the HRA indicated with industrial land use scenario there is no posing health risk, further sampling of the on-site well is optional and does not necessarily has to happen.

3.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

3.1 INTRODUCTION

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the 1990 National Oil and Hazardous Substances Pollution Contingency Plan (NCP) jointly require that on-site removal actions attain, to the extent practicable, or waive federal (or more stringent state) environmental applicable or relevant and appropriate requirements (ARARs) throughout the response action. The Osage Industries site is not a Superfund site; therefore, it is not directly subject to CERCLA. However, the determination of ARARs supporting characterization and removal actions at the site follows guidance promulgated by EPA for use with CERCLA response actions.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental and siting laws that specifically address a hazardous substance, pollutant, contaminant, removal action, location, or other circumstances at a site. Although a requirement need not have been promulgated specifically to apply to CERCLA-like response actions, all jurisdictional prerequisites of the requirement must be met for it to be considered applicable. When all elements of a requirement are found to be applicable to the activities associated with the response action, all substantive parts of that requirement must be followed or attained (unless one or more of six specific criteria for waiving the requirement is met).

Relevant and appropriate requirements are those that address situations or problems sufficiently similar to those encountered at the site (relevant) and that are well suited to the conditions of the site (appropriate). Once a requirement is deemed to be both relevant and appropriate, it must be attained by on-site response actions in the same substantive fashion as applicable requirements. In the event that a requirement is found to be relevant but not appropriate, given site-specific circumstances, such a requirement would not be adopted as an ARAR for the response action. However, portions of a requirement can be found to be relevant and appropriate to a response action, while other portions can be found to be not applicable. Regulatory guidance allows for portions of a requirement referenced herein to be adopted as relevant and appropriate. In the case of this site, while soil with concentrations above waste characterization ARAR concentration limits technically constitutes a hazardous waste, the entirety of RCRA Subtitle C requirements is not applicable. Nevertheless, portions are relevant and appropriate.

3.2 PROPOSED CLOSURE SCENARIO

The basic remediation scenario for Osage Industries under consideration in this RAWP is off-site disposal, involving a final removal of waste or soils impacted with concentrations above the proposed cleanup goals for the COCs, as provided in Section 4.0.

For on-site activities, only the substantive elements of ARARs are valid; off-site response activities are subject to both the substantive and administrative requirements of ARARs. The respective technical approach of each of the response action alternatives (excluding “No Action”) considered in this RAWP involves the off-site transportation of impacted soil and disposal at an appropriate landfill.

3.3 ARAR EVALUATION PROCESS

The process for the evaluation and adoption of ARARs for this RAWP was based on EPA guidance (EPA, 1988). A selection of federal and state laws and regulations commonly adopted as ARARs in environmental response actions is provided in Table 3-1. The ARARs cited and adopted in the evaluation process described in this section are shown in the tables by a "Yes" in bold print. When a state regulation is either broader in scope or more stringent in requirements than its federal counterpart, it is the dominant ARAR.

TABLE 3-1

Potential Federal and State of California ARARs
Osage Industries Site
Rosamond, California

	Common Acronyms	Citation	Adopted as ARAR
Federal Statute or Regulation			
Resource Conservation and Recovery Act	RCRA	42 USC 6901-6987	**Yes**
Federal Water Pollution Control Act (Clean Water Act)	CWA	33 USC 1251	No
Safe Drinking Water Act	SDWA	42 USC 300	No
Clean Air Act	CAA	42 USC 7401	No
Department of Transportation	DOT	40 CFR 173, 178, 179	No
Superfund Amendments and Reauthorization Act of 1986	SARA	42 USC 6901-6957, 11001	No
Hazardous and Solid Waste Amendments	HSWA	42 USC 6901	No
Hazardous Material Transportation Act	HMTA	49 USC 1801	No
Federal Insecticide, Fungicide, and Rodenticide Act	FIFRA	7 USC 136	No
Endangered Species Act	ESA		No
National Historic Preservation Act	NHPA	16 USC 470	No
Marine Protection, Research, and Sanctuaries Act	MPRSA	33 USC 1401	No
State of California Statute or Regulation			
California Health and Safety Code	CH&S	Health and Safety Code	**Yes**
		Section 25100-25249	
		Section 25915	
California Natural Resources	CNR	Title 14 CCR	No
California Environmental Health, Division 4	NA	Title 22 CCR	**Yes**
		Guidelines by OES only	
		Section 12000, et seq.	
		Section 66261-66261.126	
		Section 66262.10-66262.70	
		Section 66265.16	
		Section 66263	
		Section 66264-66265	
		Section 66266	
		Section 66268	
		Section 66270	

TABLE 3-1

(Continued)

	Common Acronyms	Citation	Adopted as ARAR
State of California Statute or Regulation (cont'd)			
California Environmental Health, Division 4 (Cont'd)		Section 66272-67382	
		Section 67430	
		Section 67450	
California Waters	NA	Title 23 CCR	No
Toxic Pit Cleanup Act	NA	Section 25208-25208.2	No
California Water Code	NA	Water Code	No
California Public Health Air Resources Board	CARB	Title 17 CCR	No
California Government Code	NA	Government Code	No
California Public Resource Code	NA	Public Resources Code	No

ARAR = relevant and appropriate requirements
CCR = California Code of Regulations
CFR = Code of Federal Regulations
OES = Office of Emergency Services
NA = not applicable
USC = unified soil classification

A selection of site characteristics and other information specific to the associated response action used in the refinement and selection of ARARs is provided in Table 3-2. Potentially applicable or relevant and appropriate requirements summarized for chemicals and actions associated with this RAWP are summarized in Tables 3-3 and 3-4, respectively.

Soil is the medium of concern for this RAWP; therefore, chemical- and action-specific ARARs that focus on chemical impacts to soil are selected as the most applicable to this site. Similarly, ARARs (e.g., MCLs) exclusively applicable to aqueous media were not adopted as applicable.

3.4 CHEMICAL-SPECIFIC ARARS

Chemical-specific ARARs are requirements that include risk-based numerical values (when combined with site-specific information) used to establish the acceptable amount or concentration of a chemical that may be released into or left in the environment.

The federal and state chemical-specific ARARs currently adopted for the alternatives evaluated in support of this removal action are provided in Table 3-3. Chemical-specific ARARs may be adopted as removal cleanup goals when they set an acceptable level for the protection of human and ecological health with respect to site-specific factors (EPA, 1988). Accordingly, cleanup goals for this RAWP also are provided in Table 3-3.

TABLE 3-2

Site Information Summary
Osage Industries Site
Rosamond, California

Criteria	Site/Removal Action Feature
COC	Dioxins/furans and trace metals [arsenic (As), lead (Pb), cadmium (Cd)]
Medium of Concern	Soil
Human Health Scenario	Industrial
Ecological Risk Concerns	None
Special Location Features	Minimal perimeter fencing in a portion of the site
Off Site Hazardous Waste Disposal	Yes
On/Off-Site Discharge to Surface Water or Groundwater?	None
On-Site Treatment/Disposal?	None
Variances, Waivers, Exemptions	None
Other Criteria	Background COC concentrations (mg/kg) As = 38.4; Pb = 7; Cd = ND; Dioxins = 6.44E-05

COC = contaminant of concern
mg/kg = milligrams per kilogram
ND = not detected

3.5 LOCATION-SPECIFIC ARARS

Location-specific ARARs restrict or prohibit certain activities or limit concentrations of hazardous chemicals based on geographical or land-use concerns. (See Section 2.0 for a description of site features and surroundings.) Currently, no federal or state location-specific ARARs are adopted for this RAWP.

3.6 ACTION-SPECIFIC ARARS

Action-specific ARARs are technology- or activity-based requirements or constraints on response actions. Chemical- and location-specific ARARs often are scoped and adopted early in the response action; evaluation of action-specific ARARs is, by necessity, associated primarily with the analysis of response action alternatives (and most particularly with the one implemented).

The federal and State of California action-specific ARARs currently adopted for the alternatives evaluated in this RAWP are provided in Table 3-4, along with a representative list of actions associated with the implementation of the respective response actions. As unanticipated site conditions are encountered or revisions to the technical approach are made in the field, the resultant changes to the associated actions will be reviewed to evaluate whether other requirements may then be ARARs.

TABLE 3-3

Chemical-Specific ARARs
Osage Industries Site
Rosamond, California

	Federal[a]			State[a]				
	Res PRG	Ind PRG	TCLP	CPRG[b]	SLD[c]	TTLC	STLC	
Chemical	**NA (mg/kg)**	**NA (mg/kg)**	**40CFR 261.24 (mg/L)**	**NA (mg/kg)**	**CH&S 25157.8 (mg/kg)**	**22CCR 66261.24 (mg/kg)**	**22CCR 66261.24 (mg/L)**	**Removal Goal[d]**
Antimony	31.29	409				500	15	409
Arsenic[e]	0.39	1.59	5.0	0.062/0.25		500	5.0	**38.4**
Barium	5,375	66,577						66,577
Beryllium	154	1,941						1,941
Cadmium	37.03	451	1.0			100	1.0	**148.6**
Chromium	211	448	5.0			2,500	5	448
Cobalt	903	1,921						1,921
Copper	3,129	40,877				2,500	25	40,877
Lead	400	750	5.0	150/NA	350	1,000	5.0	**1,000**
Molybdenum	391	5,110						5,110
Mercury	23.46	307	0.2			20	0.2	307
Nickel	1,564	20,439						20,439
Selenium	391	5,110						5,110
Silver	391	5,110						5,110
Vanadium	78	1,000				5,000	250	1,000
Zinc	23,000	100,000				5,000	250	100,000
2,3,7,8-TCDD (Dioxins)[f]	3.90E-06	1.60E-05						**3.25E-04**
Indeno(1,2,3-c,d) pyrene	0.62	2.1						2.10
Thallium	5.16	67.45				700	7.0	67

[a] Blank cell indicates that a concentration value for that analyte is not available for that requirement.
[b] CPRG: California-modified PRG (Res/Ind).
[c] SLD: Soil Lead Disposal requirement.
[d] Removal goals for lead are based on TTLCs; arsenic removal goal is based on background concentration; cadmium and dioxin removal goals are based on 1E-05 cancer target risk and Cal/EPA (OEHHA) cancer potency factors.
[e] Arsenic PRG values are cancer endpoint values to provide the most stringent protection of human and ecological health. removal goal is based on background concentrations representative of the site.
[f] 2,3,7,8-TCDD (Dioxins) = 2,3,7,8-tetrachlorodibenzodibenzo-p-dioxin equivalency based on World Health Organization Toxicity Equivalency Factors (TEF WHO-97).

ARAR = applicable or relevant and appropriate requirements
Cal/EPA = California Environmental Protection Agency
CCR = California Code of Regulations
CFR = Code of Federal Regulations
CH&S = California Health and Safety
mg/kg = milligram per kilogram
mg/L = milligrams per liter
NA = not applicable
OEHHA = Cal/EPA Office of Environmental Health Hazard Assessment (http:www.oehha.ca.gov)
PRG = preliminary remediation goal
TTLC = total threshold limit concentration

PRGs are available @ http://www.epa.gov/region09/waste/sfund/prg

TABLE 3-4

Action-Specific ARARs
Osage Industries Site
Rosamond, California

Activity	Statute/Regulation Citation	Potentially Applicable Requirement(s)	Findings	Compliance Status
Site Security	CH&S 25359.5 22 CCR 66264.14	Fencing, limit access to site.	Active portion of facility will be fenced with locked gate and signage.	Applicable Applicable
Soil Excavation	22 CCR 66268.40, CH&S Section 25179.5(4)	LDRs.	LDRs will be met for all hazardous waste that will be placed on land unless otherwise approved for disposal by DTSC.	Applicable
Visible Emission	KCAPCD, Rule 401	Limits visible particulate emissions.	Dust suppression measures will be employed during response actions.	Applicable
Nuisance Emission	KCAPCD, Rule 419	Prohibits discharge, from any source, contaminants that cause injury, detriment, nuisance, or annoyance.	Dust suppression measures will be employed during response actions.	Applicable
Backfilling				
HazWaste Soil: Identification	22 CCR 66262.11	Hazardous waste identification.	Soil will be analyzed to determine if it exhibits hazardous characteristics.	Applicable
HazWaste Soil: Containerization	22 CCR 66264.170-66264.178	Hazardous waste use and management of containers requirements.	Containerization, storage, and time requirements to be followed.	Applicable
HazWaste Soil: Storage and Labeling	22 CCR 66262.30 et seq.	Hazardous waste handling requirements.	Waste containers will be labeled and marked in accordance with requirements.	Applicable
HazWaste Soil: Transportation	40 CFR 107, 171.1-172.558, 263; 22 CCR 66420-465, 66530-564, 66470-515	Hazardous waste transporters licensing.	Properly licensed transporters will be used for hazardous waste transportation.	Applicable

TABLE 3-4

(Continued)

Activity	Statute/Regulation Citation	Potentially Applicable Requirement(s)	Findings	Compliance Status
HazWaste Soil: Disposal	27 CCR 20200(a)(2)	Requires that wastes identified as hazardous, designated nonhazardous, or inert solid waste be allowed only at waste management units that have been approved and classified.	Excavated soil will be disposed of properly.	Applicable
Lead-Impacted Soil Disposal	CH&S 25157.8	Disposal of lead-impacted soil.	Soils with lead detections reported > 350 mg/kg must be either disposed of in a Class I Landfill or a Class II landfill, as long as the disposal facility meets certain conditions.	Applicable
Stormwater Discharge	40 CFR Part 122, 123, 124 SWRCB Order 99-08 DWQ	Regulates pollutants in discharges of storm water associated with construction activity (clearing, grading, excavating, etc.) involving the disturbance of 1 or more acre.	Since 1 or more acre of land will not be disturbed during implementation of the removal alternative, this requirement is not applicable. However, the BMPs pertinent to the construction activities are relevant and appropriate to all soil-disturbing activities.	Applicable
Policy and Procedures for Investigation and Cleanup and Abatement of Discharges Under the Water Code Section 13304	SWRCB Resolution 92-49	Dischargers are required to clean up and abate the effects of discharges in a way that promotes the attainment of background water quality, or the best water quality that is reasonable if background levels cannot be restored.	By removing contaminated soil, groundwater quality will be protected. No groundwater remediation is included in this RAWP.	Not Applicable
EPA Region 9 Preliminary Remediation Goals	EPA Guidance	Risk-based tool used for evaluating and cleaning up contaminated sites.	PRGs will be used where appropriate, although more specific Human Health Risk Assessment values are available.	TBC

TABLE 3-4

(Continued)

Activity	Statute/Regulation Citation	Potentially Applicable Requirement(s)	Findings	Compliance Status
Designated Level Methodology for Waste Classification and Cleanup Level Determination	RWQCB Guidance	Provides guidance on how to classify wastes to meet the SWRCB hazardous waste management requirements and designated, nonhazardous, and inert waste management requirements.	This guidance will be used as necessary.	TBC

ARAR	=	applicable or relevant and appropriate requirements
BMP	=	best management practice
CCR	=	California Code of Regulations
CH&S	=	California Health and Safety
DTSC	=	Department of Toxic Substances Control
EPA	=	Environmental Protection Agency
KCAPCD	=	Kern County Air Pollution Control District
LDR	=	land disposal restriction
mg/kg	=	milligram per kilogram
PRG	=	preliminary remediation goal
RAWP	=	removal action work plan
RWQCB	=	California Regional Water Quality Control Board
SWRCB	=	State Water Resources Control Board
TBC	=	to be considered

3.7 TO BE CONSIDERED MATERIALS

Many federal and state environmental and public health agencies develop criteria, advisories, guidance, and proposed standards that are not legally enforceable but contain information that would be helpful in carrying out or determining the level of protectiveness of a selected remedy. Such "to be considered" (TBC) materials are meant to complement compliance with ARARs, but they are not ARARs themselves.

Waste classification guidance provided in 23 CCR Chapter 15, on how to classify wastes according to Title 23 and Title 27 has been adopted as a TBC requirement. It is an appropriate and relevant (but nonpromulgated) requirement related to the performance standards to be considered in determining the classification of wastes and contaminated soils.

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4.0 SCREENING AND DEVELOPMENT OF REMOVAL ACTION ALTERNATIVES

This section identifies the RAOs and the COCs for the site and screens and evaluates potential removal action alternatives for the contaminated soil at the site. These alternatives are screened using the CERCLA criteria to select a preferred alternative.

4.1 REMOVAL ACTION OBJECTIVES AND COCS

RAOs consist of media-specific cleanup levels selected to protect human health, water quality, and the environment. The RAOs identify the COCs, the receptors and exposure routes, and the acceptable concentration thresholds (i.e., cleanup goals) for waste remaining on site upon completion of the removal action. The RAOs are established based on the environmental or health-based standards presented as ARARs in Section 3.0. The RAOs and ARARs provide the basis for selecting the removal actions to be implemented. The RAOs for the Osage Industries site are identified hereafter.

1) Meet compliance with the ARARs delineated in Section 3.0.
2) Restore the site to the extent necessary and technically and economically feasible to support existing and proposed land uses; for Osage Industries, the land use is industrial and/or commercial.
3) Protect human health, to the extent that is technically and economically feasible, by preventing and/or limiting exposure to COCs in soil at concentrations that would result in a lifetime cancer risk greater than 1.0E-05 (i.e., one in 100,000) and/or an HI greater than 1.0.
4) Reduce the migration of soluble metals to groundwater.
5) Given that the site is owned by a private party, ensure that the selected removal action does not interfere with site activities over the long run.

These RAOs, which have been adopted for the site, address hazardous and carcinogenic levels of the COCs while considering other factors, such as land use and site ownership. Because of the industrial/commercial nature of the land use, the on-site worker's risk pathways are exposure to site soils through ingestion, dermal contact, or inhalation of airborne particulate matter (i.e., fugitive dust). The RI HRA showed that there is a cancer risk greater than one in 100,000 for the on-site worker, but that the noncarcinogenic health risk (HI = 0.09) is less than 1 for the on-site worker (URS, 2005).

The COCs for the site can be identified by reviewing RAO Items 1 through 4. The COCs are those chemicals/metals that pose a cancer health risk (greater than 1.0E-05) to the on-site worker or that can mobilize readily to groundwater at concentrations exceeding toxicity limits. The RI risk assessment identified four constituents (arsenic, cadmium, lead, and dioxins/furans) as carcinogenic health risk drivers. Therefore, arsenic, cadmium, lead, and dioxins/furans are the primary COCs, and the respective cleanup goals generally should be risk-based concentrations considered health protective of on-site workers exposed to residual chemical concentrations in site soils. The risk-based concentrations correspond to a fixed level, or target, of risk consisting of a one in 100,000 (10^{-5}) cancer risk or a potential for an adverse noncarcinogenic health effect based on an HQ of 1, whichever is more stringent. The 1 in 100,000 cancer risk corresponds to the regulatory definition of a "no significant risk level," as defined in Title 22 CCR Section 12703(b); it is within the upper-bound lifetime cancer risk range of 1 in 10,000 (10^{-4}) to 1 in one million (10^{-6}) that is considered acceptable (see Title 40 Code of Federal Regulations (CFR), Section 300.430). Based on EPA (1991) guidance, removal or corrective action at a site generally is not warranted unless the cumulative carcinogenic risk is greater 1 in 10,000. The noncarcinogenic health effect target, or HQ, is 1, which is an exposure that is likely without an appreciable adverse health effect; HQ values exceeding 1 indicate that an estimated daily chronic dose may exceed an acceptable exposure. The HQ values for all chemicals and exposure routes are summed as the HI for each receptor assessed. Similar to the HQ, an HI value exceeding 1 also may indicate a potential adverse health effect if the effect from all chemical exposures is additive.

The on-site worker exposure factor parameter values (intake rates, exposure frequency and duration, averaging times, body weight, dermal surface area, etc.) for the three exposure routes (incidental ingestion, dermal contact, and inhalation of airborne particulates and vapors) were the same as those used in the baseline human HRA presented in Section 4.0 of the RI report (URS, 2005). The parameter values are the EPA and Cal/EPA default values for on-site workers and generally reflect upper bound (90^{th} to 95^{th} percentile) exposure conditions, such as the 25-year, 250 days/year exposure duration and frequency. Consequently, the risk-based cleanup levels for the COCs should be considered conservative, health-protective estimates of residual soil concentrations at the site.

The COCs were detected in the top 2 feet or less of soil at concentrations that may result in adverse health affects to the on-site worker. Because groundwater at the on-site domestic well was encountered at approximately 34 feet bgs, and the COCs for the site have very low solubility in water, mobilization to groundwater is not a key driver for determining the cleanup levels. The proposed cleanup goals, which are generally risk-based, are listed in Table 4-1. Arsenic is the exception; background (i.e., naturally occurring) arsenic concentrations are greater than the concentration at which a cancer risk of one in 100,000 is predicted. Therefore, for arsenic, the cleanup level is set to the estimated background concentration because it is not technically or economically feasible to set the cleanup goal at a level that is below naturally occurring concentrations. Although six surface soil samples (BG-1 through BG-6) were collected to aid in the assessment of background conditions at the site, the natural range of arsenic in surface soil already was established as part of the RI performed at another site, the S.R. Kilby (Kilby) site, which also is located in Rosamond, California. During that study, DTSC staff collected over 70 off-site (background) samples from areas near the Kilby site (DTSC, 2003). The sampling results were subjected to a statistical analysis that established the following 95% upper confidence limits (UCLs) for naturally occurring arsenic in shallow soils in the Rosamond area:

- 31.7 mg/kg at 0–0.5 foot bgs;
- 38.4 mg/kg at 1 foot bgs; and
- 33.2 mg/kg at 2 feet bgs.

Since the Kilby background study addressed the larger Rosamond area and included the collection of more than 70 background samples, the results of that study are considered more rigorous than the range observed for the six surface soil samples collected as part of the Osage Industries RI effort. The 95% UCL for arsenic from the Osage study was only 8.8 mg/kg, which is clearly biased low compared to the range established by the Kilby background study. Therefore, a background concentration range of 31.7 mg/kg to 38.4 mg/kg will be assumed for naturally occurring arsenic at the Osage Industries site. Since much of the higher arsenic concentrations detected in soil at this site were at the 1-foot-bgs depth interval, the cleanup goal for arsenic will be set equal to the background concentration at 1 foot bgs (i.e., 38.4 mg/kg). Cleanup of arsenic-contaminated soil to this level represents a cancer risk less than 2 in 100,000 to the on-site worker. The overall risk from all

COCs would still be less than 5 in 100,000, which is within the generally acceptable risk range of one in one million and one in 10,000.

TABLE 4-1

Proposed Cleanup Goals for Industrial Soil (On-Site Worker)
Osage Industries Site
Rosamond, California

Chemical	Human Health Risk-Based Cleanup Levels (mg/kg)	Background Concentrations (95% UCL)[a] (mg/kg)	Proposed Cleanup Goal (mg/kg)
Arsenic	27.7	8.8 [a] /31.7,38.4, 33.2 [b]	38.4 [c]
Cadmium	148.6	ND (<0.25)	148.6[d]
Doxins/Furans (2,3,7,8-TCDD eq)	3.25E-04	6.44E-05	3.25E-04[d]
Lead	2,858[e]	6.98	800[f]
Total Cancer Risk			**3.4E-05**

[a] Site-specific background concentrations are statistically determined. Concentrations are based on the 95% UCL of the arithmetic mean of six background soil samples collected at locations representative of background conditions at Osage Industries.
[b] Background concentrations are at 0.5, 1, and 2 feet bgs, respectively, based on the 95% UCL of the arithmetic mean of over 70 background soil samples collected at locations representative of background conditions in the greater Rosamond area (DTSC, 2003).
[c] Cleanup goal is based on the background concentration (in the greater Rosamond area) at 1 foot bgs because the highest concentrations of arsenic at the Osage Industries site were found at this depth interval.
[d] Cleanup goal is based on potential human health risk at a cancer risk target of 1 in 100,000 (1E-05), defined in 22 CCR 12703(b) as the "no significant risk level." The target risk represents one excess case of cancer in an exposed population of 100,000. Receptors are on-site workers exposed to soil contaminants through incidental ingestion, dermal contact, or inhalation of airborne particulates.
[e] Health-risk-based cleanup level based on DTSC's Leadspread PRG-99. Soil lead concentration is estimated to result in a 99th percentile estimated blood-lead level of 10 µg/dl for occupational receptors exposed to lead in site soil and airborne dust.
[f] USEPA Region 9 lead PRG.

3.4E-05 = 3.4 in 100,000 (0.000034)
bgs = below ground surface
CCR = California Code of Regulations
DTSC = Department of Toxic Substances Control
mg/kg = milligram per kilogram
ND = non-detected (below detection limit)
PRG = preliminary remediation goal
TCDD eq = 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalent for all congeners.
UCL = upper confidence limit
µg/dl = micrograms per deciliter

4.2 SCREENING OF REMOVAL ACTION ALTERNATIVES

A comprehensive data review following the RI indicated that immediate action was required at the ash piles to the south of the fenced area (labeled ash pile 1 through 4) and the drummed ash. This immediate action was referred to as "debris removal," and it was performed in August 2004 to address imminent health concerns deriving from these areas. Following the debris removal, four point composite soil samples were collected from the bin of excavated soil and from the plastic drums containing the removed ash material. These samples were analyzed for metals using the TCLP to determine disposal requirements. Results of these analyses indicated that both samples (i.e., from the excavated soil bin and from the ash drum) exceeded the TCLP limit of 5 mg/L for lead; the drum sample also exceeded the TCLP limit of 1 mg/L for cadmium. As a result, the materials in the bin and plastic drums were classified as a RCRA hazardous waste. The drummed materials were subsequently consolidated and disposed of at the Waste Management, Inc., Class I landfill in Kettleman, California, in January 2005.

Despite the interim debris removal, several areas on site still have COC concentrations that exceed the cleanup levels presented in Table 4-1. The sampling analysis results from these areas and the approximate area and volume of contaminated soil are listed in Table 4-2. The locations of wastes shown in Table 4-2 are the areas that may require removal action.

The potential removal actions are described hereafter. General response actions (GRAs) describe the range of actions that could be applied to the types of contamination at the site, which are found in contaminated soil and stored waste. Following are the GRAs considered for the site.

- **No Action**—Required for consideration by the NCP. No removal action is taken, and no attempt is made to satisfy the RAOs.
- **Institutional/Engineering Controls**—Legal, administrative, and engineering controls implemented to limit access to, and restrict the use of, the real property at the site, to limit or eliminate exposure to contamination.
- **Monitored Natural Attenuation**—Monitoring of the effectiveness of natural attenuation processes in reducing the mass, toxicity, volume, and mobility of contamination at the site.
- **Containment**—Actions that result in the contaminated soil and waste being contained or controlled, thus preventing exposure to contamination and reducing or eliminating contaminant migration.
- **Removal/Excavation**—Actions taken to physically remove contaminated soil and waste from the site.
- **In Situ Treatment**—Actions taken to reduce the toxicity, mobility, and/or volume of contaminated soil and waste in place, without removal.
- **Ex Situ Treatment**—Actions taken to reduce the toxicity, mobility, and/or volume of contaminated soil and waste after removal.
- **On-Site Storage or Use**—Actions taken to store or dispose of removed soil and waste on site, to use treated soil as backfill, or to separate recyclable/usable material.
- **Off-Site Disposal**—Actions taken to dispose of the untreated soil/waste at an off-site location.

The GRAs are screened hereafter with respect to overall effectiveness, implementability, and relative implementation cost.

TABLE 4-2

Inventory of Site Waste Greater than Proposed Cleanup Goals (Potential Removal Action Required) Osage Industries Site Rosamond, California

Sample	Arsenic (mg/kg) (PCG=38.4)	Cadmium (mg/kg) (PCG=148.6)	Lead (mg/kg) (PCG=1,000)	Dioxins/Furans (pg/g) (PCG=325)	Debris Removal (August 2004)	Estimated Contaminated Area, Depth, and Volume
Ashpile 1–0.5[a] (Soil Beneath) Ashpile 1–1.5[a] (Soil Beneath)	70.5 3.72	32.2 ND	6,960 10.4	— —	Ash pile was removed but soil beneath is contaminated	Area = 300 ft^2 (20 x 15) Depth = 1.0 ft Volume = 300 ft^3
Corroded Drums 0.5[a] (Soil Beneath) 1.0[a] (Soil Beneath)	1,400 3.71 2.23	707 16.2 ND	66,100 9.98 9.59	—	—	Area = 900 ft^2 (30 x 30) Depth = 0.5 ft Volume = 450 ft^3
Furnace (Ash Sample)	65.8	16.5		1,736	—	Area = 2 ft^2 (2 x 1) Depth = 1.0 ft Volume = 2 ft^3
NOP 1–0.5[a] NOP 1–1.0[a]	17.5 7.31	25.4 1.22	3,950 234	—	—	Area = 840 ft^2 (30 x 28) Depth = 1.0 ft Volume = 818 ft^3
OS 1–0.5[a] OS 1–2.0[a]	7.02 4.13	166 40.0	1,700 41.1	—	—	Area = 225 ft^2 (15 x 15) Depth = 1.0 ft Volume = 225 ft^3
Transformer 1.0 (Soil Beneath)	253 9.64	121 23.2	9,520 46	—	—	Area = 1,050 ft^2 (30 x 35) Depth = 0.5 ft Volume = 525 ft^3

[a] This number refers to the sample depth (e.g., 0.5 implies sample taken at 0.5 foot bgs).

bgs = below ground surface
ft = feet
ft^2 = square feet
ft^3 = cubic feet
mg/kg = milligrams per kilogram
ND = not detected
NOP = north ore pile
OS = oil stain
PCG = proposed cleanup goal
pg/g = picograms per gram

4.2.1 No Action

The No Action response action serves as a baseline against which other options are compared. It is included to evaluate the risks to human health and the environment if no additional action is taken. No Action would not be effective in limiting the exposure of human and ecological receptors to contaminants. Implementation would require approval from DTSC and the public. However, the cost to implement would be low to negligible. No Action is retained as a possible response action.

4.2.2 Institutional/Engineering Controls

Institutional/engineering controls comprise land-use restrictions and the installation of site controls (e.g., security fences, signs, and markers limiting access) to limit human exposure to contaminated soil and waste on site. Long-term institutional controls would be required in conjunction with any remedy in which contaminated soil and waste are left in place. In the case of the Osage Industries site, land use has been zoned as industrial/commercial. Therefore, exposure of the residential population to waste remaining on site is expected to be negligible. However, exposure of the on-site worker to contamination has been identified as a health risk driver. Therefore, while land-use restrictions remain in place, exposure to contamination is reduced but not eliminated. In addition, depending on the extent of the removal action taken at the site, it may be necessary to install additional fencing and signs or markers to further restrict access to the site. Institutional/engineering controls are thus somewhat effective in restricting human exposure but would not be effective in protecting the environment. Continued implementation would be practicable, and the cost would be low. Because the cleanup levels are based on risk to the on-site worker, land-use controls (in the form of industrial/commercial deed restrictions) should be retained in conjunction with any other action considered at the site, to satisfy the RAOs. Therefore, this GRA will be retained.

4.2.3 Monitored Natural Attenuation

Monitored natural attenuation (MNA) is defined as any combination of physical, chemical, or biological processes that can reduce the mass, toxicity, mobility, and volume of contamination. Natural attenuation processes are not expected to be effective over a reasonable time frame (compared to other, more active response actions) for the type of contamination (metals and dioxins/furans in soil and waste/debris) at the site. Therefore, MNA would have low effectiveness in meeting the RAOs for the site. Implementation would have low cost but would require approval from DTSC and the public. Because of the low effectiveness, MNA is not retained as a viable response action.

4.2.4 Containment

Containment is a GRA that isolates contamination to prevent direct contact with human or ecological receptors and to eliminate or reduce the mobilization and migration of contaminants in soil to groundwater, surface water, or ambient air. The most effective containment for soil and waste is capping of the contaminated material. Specific capping process options include soil cover, clay and soil cap, engineered cap (synthetic material, compacted/bentonite clay, etc.), and asphalt or concrete cap. For practical purposes, capping would require that the contaminated soil and waste first be removed and consolidated in one area. Capping, specifically engineered and asphalt or concrete caps that remain intact over the long term, can be effective in isolating the contaminated soil and waste and reducing mobilization to groundwater and other media. However, implementation at the site is not feasible because Osage Industries is owned by a private party that may not provide long-term maintenance of the capping. The cost for an engineered cap can be moderate to high, especially when combined with the requirement that the contaminated soil and waste be removed and consolidated in one area. Because of the problems associated with long-term maintenance, the containment GRA will not be retained for further consideration.

4.2.5 Removal/Excavation

With this GRA, contaminated soil and waste are excavated and removed. Excavation and removal can be achieved using conventional construction equipment, such as backhoes, scrapers, bulldozers, front-end loaders, power shovels, and rotary augers, depending on the volume and depth of contaminated material. Removal is effective when combined with capping, treatment, and/or disposal (at an on-site or off-site location). Excavation can be implemented easily, especially because it would be performed to a depth of 2 feet bgs or less. Removal/excavation will be retained as a viable GRA.

4.2.6 In Situ Treatment

The nature of the waste at the site, which consists primarily of metals and dioxins/furans in shallow soils and in containers or equipment (e.g., transformer and furnace), does not lend itself to viable options for in situ treatment, such as vitrification, oxidant injection, or biological treatment (e.g., bacteria inoculation). In situ treatment is not considered effective or implementable at this site and probably would be costly, compared to other more viable options. Therefore, this GRA will not be retained for further consideration.

4.2.7 Ex Situ Treatment

This GRA requires that contaminated soil and waste be excavated and removed to an on-site location for treatment aboveground. The most viable ex situ treatment probably would be incineration; however, the ash and any other remaining material would still have to be disposed of off site. This GRA would be effective; however, because the site is owned by a private party, implementation would be difficult on site, and costs would be high, compared to off-site disposal without treatment. This GRA will not be retained for further evaluation.

4.2.8 On-Site Storage or Use

This GRA is not viable because it is only applicable to contaminated soil and waste that has already been treated or that is going to be capped. Since on-site treatment or containment was not retained for the site, this GRA also will not be retained, though excavated soil and waste may be drummed and stored temporarily in a staging area before they are disposed of off site.

4.2.9 Off-Site Disposal

This GRA is effective when used in combination with the excavation and removal response action. Disposal to off-site landfills reduces the mobility of the contaminants by placing the contaminated material in a controlled disposal facility. Disposal of contaminated material does not necessarily reduce the toxicity and volume of contamination, though some landfills may incinerate the waste, in which case waste toxicity and volume also would be reduced. Soil and waste that are to be disposed of would require characterization to verify that they meet the acceptance criteria of the landfill or disposal facility. If the waste is characterized as hazardous, it will have to be disposed of at a RCRA Class I landfill. RCRA Class II and Class III facilities would be used for non-hazardous waste and uncontaminated soil disposal, respectively. Disposal at an off-site location is readily implementable but may be quite costly if the waste is classified as hazardous. This GRA is retained for further evaluation.

4.3 DEVELOPMENT AND INITIAL SCREENING OF REMOVAL ACTION ALTERNATIVES

Following the screening step, the GRAs retained for the site are as follows:

- No Action;
- Institutional/Engineering Controls;
- Excavation/Removal; and
- Off-Site Disposal.

The following three viable removal action alternatives can be constructed from these GRAs.

Alternative 1: No Action. This alternative is included as a baseline for comparison to other remediation alternatives, in accordance with NCP requirements. This alternative makes no attempt to limit human or environmental contact with the contaminated waste or to remove or treat contaminants in the soil. It also does not include any monitoring to document the status of contaminants at the site or maintenance of existing fencing, signage, site conditions, or land-use restrictions.

Alternative 2: Institutional/Engineering Controls. This alternative uses administrative and engineering controls to limit human contact with contaminated waste and soil. Institutional controls include land-use restrictions, such as restrictions on future (residential) development of the site. These restrictions may include land and groundwater restrictions to prohibit residential occupancy and limit future use to industrial/commercial use, restrict any activities that require excavation of soil from the site, and prevent installation of production wells for drinking water. Engineering controls limit access to the contaminated soil and waste through actions such as the installation and maintenance of fencing and signage to restrict site access for non-authorized personnel and dust control measures to prevent the off-site migration of dust contaminated with metals and dioxins/furans.

Alternative 3: Land-Use Controls, Excavation, Removal, and Off-Site Disposal. This alternative requires that contaminated soil and waste, as delineated in Table 4-2, be excavated and removed to an off-site facility. The cleanup levels for the excavation effort are risk-based and assume a one in 100,000 cancer risk to the on-site worker under an industrial land-use scenario. Therefore, deed restrictions would have to be imposed on the property (if not already in place) to restrict future land use to industrial/commercial uses and to inform would-be property owners of the risk associated with the contamination remaining on site. This alternative involves excavation, removal, and off-site disposal of the hazardous waste. Hazardous waste is identified as soil or debris/waste on site with concentrations of COCs exceeding the cleanup levels listed in Table 4-1. The hazardous waste inventory for the site, including the waste volume that would be removed, is listed in Table 4-2. All of the hazardous waste and soil would be transported off site and treated and/or disposed of at an off-site disposal facility as a RCRA hazardous waste. The disposal facility selected for costing purposes is the Chemical Waste Management facility in Kettleman, California.

4.3.1 Initial Screening Criteria

The NCP requires that the preliminary alternatives be subjected to an initial screening to eliminate those that have adverse impacts on human health and the environment, are not applicable to the contaminants and media at the site, or are much more expensive to implement than other alternatives that provide essentially the same level of protection. The alternatives remaining after the initial screening are developed further and evaluated in greater detail in subsequent sections. The screening criteria are discussed hereafter.

> Effectiveness Screening: The level of effectiveness is based on the technology's ability to meet the remediation goals and protect human health and the environment. Alternatives that have significant adverse impacts or do not adequately protect public health and the environment will be eliminated from further consideration.

> Implementability Screening: Implementability is the assessment of the technical and administrative feasibility of each alternative technology. Evaluation of technical feasibility is used to eliminate the technologies that are clearly ineffective or unsuitable for the site; administrative feasibility refers to the ability to obtain permits for site actions and the availability of treatment, storage, and disposal services. The availability of necessary equipment and technical personnel also is included. Alternatives that are not technically or administratively feasible will be eliminated from further consideration.

> Cost Screening: Because only limited emphasis is placed on cost at this phase of the evaluation, per EPA guidance, capital costs were used to compare technologies and process options. Alternatives for which costs are substantially greater than those of other alternatives in the same technology category, that provide the same level of public health and environmental protection, will be eliminated from further consideration. A more detailed cost evaluation is conducted only on alternatives remaining after the public health and environmental screening.

4.3.2 Initial Screening of Removal Alternatives

In this section, the removal action alternatives presented are subjected to an initial screening based on the criteria of effectiveness, implementability, and relative cost. Alternatives that are retained as a result of this screening are evaluated in more detail in Section 5.

Effectiveness

Alternative 1 No Action. This alternative does not prevent human contact with, or the migration of, contaminants. The RAOs and the ARARs are not met. No Action probably would not have public and regulatory support. This alternative is retained as the baseline against which the effectiveness of other alternatives are judged, however, as required by the NCP.

Alternative 2 Institutional/Engineering Controls. This alternative would limit human contact with contaminants by installing and maintaining the integrity of a fence around the site and restricting future uses for the site. Signs would be posted to limit activities that would expose on-site workers, construction workers, and visitors to contamination. However, this alternative is not effective in the long-term because the site is owned by a private party, and upkeep of the engineering controls may be difficult to enforce. In addition, no attempt would be made to remove contaminated soil and waste, and there would be no reduction in toxicity, mobility, or volume of contamination. Therefore, metals solubility would remain as a potential threat to groundwater, and the health risk to the on-site worker from contaminated soil would not be eliminated. This alternative would not satisfy the RAOs and ARARs for the site. Therefore, this alternative is eliminated from further consideration, though aspects of this alternative (i.e., the industrial land-use designation) are incorporated into Alternative 3.

Alternative 3 Land-Use Controls/Excavation/Removal/Off-Site Disposal. This alternative requires that contaminated soil and waste, as delineated in Table 4-2, be excavated and removed to an off-site RCRA facility as RCRA hazardous and/or non-RCRA California hazardous waste. The cleanup levels for the excavation effort are risk-based and assume a 1.0E-05 cancer risk to the on-site worker under an industrial land-use scenario. Therefore, deed restrictions must be imposed on the property (if not already in place) to restrict future land use to industrial uses and to inform would-be property owners of the risk associated with waste remaining on site. Therefore, this alternative would satisfy the RAOs and ARARs and is effective over the long term, provided the industrial/commercial land use (through deed restrictions) is implemented at the site.

Implementability

Alternatives that fulfill the objective of technical feasibility and effectiveness also must be implementable to produce a cost-effective, timely removal action. No alternatives were eliminated from further consideration because of difficulties associated with implementation.

Cost

Alternatives that provide the same level of protection to human health and the environment were further screened to evaluate relative costs. No alternatives were removed from the evaluation based on this criterion.

4.3.3 Results of Initial Screening

The two alternatives retained after the initial screening process are evaluated in detail in Section 5.0. The remaining alternatives are:

- Alternative 1: No Action; and
- Alternative 3: Land Use Controls/Excavation/Removal/Off-Site Disposal.

5.0 DETAILED ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This section describes the process for the detailed analysis of the soil and waste removal alternatives retained after the screening process.

5.1 EVALUATION CRITERIA FOR DETAILED ANALYSIS

Nine criteria are identified in the *Guidance for Conducting Removal Investigations and Feasibility Studies Under CERCLA* (EPA, 1988); seven of these will be used to evaluate the removal alternatives for the site. (The two criteria that will not be used, known as the modifying criteria, are related to public and state acceptance of the remedy.) The state agency overseeing the work at Osage Industries is Cal/EPA's DTSC. The first two criteria are known as the threshold criteria because any alternative selected for implementation must meet these two criteria. The next five criteria are known as the balancing criteria because they represent the primary criteria used to compare the removal alternatives. Following are the threshold and balancing criteria.

Threshold Criteria

- Overall Protection of Human Health and the Environment
- Compliance with ARARs

Balancing Criteria

- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, and Volume
- Short-Term Effectiveness
- Implementability
- Cost

A description of each of these criteria is presented hereafter.

Overall Protection of Human Health and the Environment: This is the primary requirement that CERCLA removal actions must meet. A remedy is protective if it adequately eliminates, reduces, or controls the current and potential risks posed by each exposure pathway identified at the site through the use of treatment, engineering controls, or institutional controls. This criterion is met if the removal action objectives identified in Section 4.0 are achieved through implementation of the alternative.

Compliance with ARARs: Compliance with ARARs is the second criterion that the CERCLA removal actions must meet. A remedy complies with ARARs if it complies with the chemical-specific, location-specific, and action-specific applicable or relevant and appropriate state and federal requirements identified in Section 3.0.

Long-Term Effectiveness and Permanence: This criterion assesses the potential risk remaining at the site after completion of the removal activities. The focus is on the extent and effectiveness of the controls that may be required to manage risk.

The two elements of risk management considered are magnitude of residual risk and adequacy and reliability of controls. The magnitude of residual risk measures the risk remaining from untreated waste or treatment residuals left on site following completion of the removal activities. The adequacy and reliability of controls is a measure of the adequacy, suitability, and long-term reliability of any controls that are included in the removal alternative to manage treatment residuals or untreated wastes that remain on site. These controls are established to ensure that any exposure of humans or the environment to residual contamination is within protective levels, to assess the potential need to replace technical components of the alternative, and to outline the risks involved if the removal action must be modified or replaced.

Reduction of Toxicity, Mobility, and Volume: This criterion assesses the permanence and degree of an alternative's reduction of threats posed by contaminants present at the site. Preference is given to alternatives that use active treatment to irreversibly reduce contaminant toxicity, mobility, and volume. Aspects of this criterion may consist of the amount of treated material, the expected levels of contaminant reduction, the reversibility of the treatment, and the amount of treatment residuals after the removal action is completed. This criterion is satisfied when treatment reduces the contamination through destruction or irreversibly reduces the contaminant toxicity and mobility.

Short-Term Effectiveness: This criterion assesses an alternative's protectiveness of human health and the environment during the construction and implementation phase until the RAOs are achieved. This includes short-term impacts on the neighboring community, workers, and the environment.

Implementability: This criterion measures the technical feasibility, the administrative feasibility, and the availability of space, services, and materials needed to construct, operate, and maintain the removal alternative. Technical feasibility refers to resolving technical unknowns during construction and operation, the reliability of an alternative during implementation, the ease of implementing necessary additional removal actions, and the ability to monitor the alternative effectively. Administrative feasibility refers to the actions required to coordinate with other offices and agencies to obtain approvals and permits. Availability of space, services, and materials refers to the availability of treatment, storage, and disposal areas and services; the availability of necessary equipment, materials, and specialists; and the availability of possible technologies. In addition, alternative implementation should not heavily impact daily activities at the site.

Cost: Costs for the alternatives have been divided into three categories: Capital costs to implement the alternative, operation and maintenance (O&M) costs, and total present worth costs. The capital costs include the major expenditures, such as excavation and removal costs required to implement the removal action. The O&M costs are ongoing costs associated with making sure the remedy remains effective over the long-term. The total present worth is the sum of the initial capital costs and the present worth value of the O&M costs, assuming a 6% interest rate and an estimated time frame for remediation to the cleanup levels. The accuracy of cost estimates is +50/-30 percent.

5.2 DETAILED ANALYSIS OF REMOVAL ALTERNATIVES

This subsection provides a description of each of the two alternatives, an assessment of the alternatives based on the five balancing criteria described in Subsection 5.1, and a final analysis of the alternative. Cost assumptions and cost details are provided in Appendix A.

5.2.1 Alternative 1—No Action

As required by the NCP, this alternative is included as a baseline for comparison throughout the entire screening process. This alternative involves no active cleanup of the contaminated soil or attempt to limit the migration of contaminants associated with the soil. This alternative does not require that land-use restrictions be imposed on the site.

Long-Term Effectiveness and Permanence. This alternative is not effective in the long-term. The current land use at the site is industrial/commercial, thus limiting residential population contact with the contaminated soil. However, if deed restrictions are not implemented, the land could, theoretically, be redesignated as residential for future development. This alternative would not satisfy ARARs and would not protect the public from long-term risks to sensitive groups.

Reduction of Toxicity, Mobility, and Volume. This alternative does not meet the requirement to reduce the mass, volume, or toxicity of the contaminants through treatment, and it is not protective of human health or the environment.

Short-Term Effectiveness. This alternative would not have any short-term impacts on the neighboring community and would not reduce contamination in the short-term.

Implementability. This alternative is easy to implement from a technical and administrative standpoint. No equipment and no personnel would be necessary for implementation. This alternative therefore meets the criteria for implementability.

Cost. No capital or O&M costs would be incurred to implement this alternative. Therefore, this alternative has no cost associated with it and meets the criteria for cost.

Final Analysis. Although the No Action alternative would be very inexpensive to implement, it would not be protective of human health or meet the RAOs. No action would not reduce the mass, volume, or toxicity of contaminants at the site or limit the migration of COCs to groundwater. In addition, future land use for the site would not be restricted under this alternative, and it is not expected to meet with community or state approval.

5.2.2 Alternative 3—Land Use Controls/Excavation/Removal/Off-Site Disposal

This alternative involves the excavation and off-site disposal of approximately 90 cubic yards (cy) of soil, exceeding the proposed cleanup goals listed in Table 4-1. The affected areas of the site and the volume of soil that would be excavated in each area are listed in Table 4-2. Costing for this alternative assumes that 100% of the excavated soil will be classified as a RCRA hazardous waste and will be placed into trucks and transported to the Chemical Waste Management RCRA disposal facility in Kettleman, California. Actual disposal costs will be determined by the contractor and will depend on the disposal facility selected, the waste characterization results, and the bench study performed by the disposal facility. Additional characterization of site soil contamination also is planned before the removal action begins. The results of this investigation may affect the estimated volume of soil to be removed and, as a result, the cost of removal. Once the removal is complete, the site will be backfilled with clean fill from on-site location(s), compacted to 90% relative compaction, and regraded to restore site drainage. For costing purposes, the excavation subcontractor is assumed to be Statewide Excavation (the DTSC contractor).

Other Assumptions. Alternative 3 has the following institutional controls and site preparatory and soil-moving components.

- Institutional controls will include deed restrictions placed on the property to restrict future land use to industrial/commercial and to preclude future use that may have adverse health effects on the general public. However, no additional fencing will be added, and no warnings or signage will be posted.
- Site preparatory activities will include the following:
  - A site survey will be conducted to establish the sample grid and to mark the extents of the excavation areas; and
  - Industrial, construction, and other debris found at the site will not be disturbed or hauled off site.
- Dust suppression measures will be incorporated into all construction activities.
- Perimeter and personal air will be monitored.
- Decontamination stations will be constructed to prevent equipment from tracking contamination off of the site.
- Confirmation soil samples will be collected and submitted to a laboratory for analysis before the excavations are backfilled.

O&M Activities. No O&M activities are associated with this alternative.

Long-Term Effectiveness and Permanence. The long-term effectiveness of this alternative is ranked high because this alternative protects human health and the environment by permanently removing on-site soil contamination and by conducting the removal activities in a way that complies with ARARs. This alternative meets the RAOs for the site.

Reduction of Toxicity, Mobility, and Volume. This alternative reduces the toxicity, mobility, and volume of site contamination by excavating and removing contaminated soil off site. If the disposal facility landfills the waste, the toxicity and mobility of contamination will be reduced permanently, but the volume will not change; typically, the disposal facility will incinerate or otherwise treat some or all of the waste, in which case the volume of contamination will be reduced permanently.

Short-Term Effectiveness. Short-term effectiveness measures the protectiveness of the alternative to workers and residents during implementation of the alternative. Implementation will include dust suppression measures, perimeter air monitoring, and track-out prevention to ensure the protection of workers and minimize impacts to off-site personnel.

Implementability. This alternative meets the criterion for technical and administrative implementability. Excavation, transport, and off-site disposal activities are common removal activities, and the work at the site will use standard soil-moving and soil-transport equipment that is readily available. Challenges may be associated with maneuvering around on-site debris.

Cost. The capital cost summary for this alternative is presented in Table 5-1 and detailed in Appendix A. The capital expenditures associated with site preparatory activities, excavation and disposal of the soil, and backfill and compaction of the excavations is approximately $91,000, assuming a 10% fee. Design and construction management is approximately $9,000. There are no O&M costs.

TABLE 5-1

Capital Costs for Alternative 3
Land-Use Controls/Excavation/Removal/Off-Site Disposal
Osage Industries Site
Rosamond, California

Item	Unit Cost ($)	Capital Cost with Markups (w/o air monitoring) ($)	Capital Cost with Markups (with air monitoring) ($)
Alternative 3—Off-Site Disposal	75,800	75,800	78,750
Bid Contingencies (5% of construction subtotal)		3,790	3,938
Scope Contingencies (10% of construction subtotal)		7,580	7,875
Construction Total		87,170	90,563
Engineering Design and Construction Oversight (5% of construction total)		4,358	4,528
Bonding and Insurance (3% of construction total)		2,615	2,717
Reporting (1% of construction total)		871	906
Fixed Fee (10% of construction total)		8,717	9,056
Total Capital Cost		**104,000**	**108,000**

Final Analysis. Alternative 3 meets the RAOs and ARARs for the site and is effective over the long-term. Because of the risk-based cleanup goals and the restricted land use, the cost to implement this alternative is reasonable. There would be a permanent reduction in the mass, volume, and toxicity of on-site contamination, commensurate with the industrial land-use designation. This, in turn, would limit the migration of COCs to groundwater. In conclusion, Alternative 3 is the preferred alternative for the Osage Industries site.

5.3 RECOMMENDED REMOVAL ACTION

The comparative analysis presented in this section serves to identify the relative advantages and disadvantages of each alternative and provides an adequate basis for selecting the recommended removal action for the Osage Industries site.

Based on this analysis, Alternative 3, Land-Use Controls/Excavation/Removal/ and Off-Site Disposal (with air monitoring), is selected as the preferred alternative for remediation of the site, based on effectiveness, implementability, and cost. This selection is contingent on community acceptance of the alternative. The work plan for implementation of this alternative is provided in Section 6.0.

6.0 REMOVAL ACTION IMPLEMENTATION

This section describes the activities, procedures, and protocols to be used to implement the recommended removal action (Alternative 3, Land-Use Controls/Excavation/Removal/ and Off-Site Disposal) for soil contaminated with arsenic, cadmium, lead, and dioxin/furan. Activities will be conducted by the DTSC removal action (RA) contractor or the DTSC oversight contractor.

6.1 PLANS, PERMITS, AND PREMOBILIZATION ACTIVITIES

This subsection describes the plans, permits, and premobilization activities for the removal action.

6.1.1 Plans

Before initiating the removal action, several plans, including the site-specific health and safety plan (HASP) and the quality assurance program plan (QAPP), which describes the confirmation sampling effort, are required. These plans are described hereafter.

Site-Specific Health and Safety Plan

A site-specific HASP will be prepared by the RA contractor. This HASP must be approved by DTSC before the removal action begins. The HASP must meet the requirements of applicable federal, state, and local regulations. These include, but are not limited to, the following:

- 29 CFR 1910.120;
- 29 CFR 1926; and
- CCR Title 8.

The HASP must address worker and nearby resident safety. Provisions of the HASP should include dust and lead monitoring protocols to address the level of dust control required to prevent off-site releases, and the level of personal protection for all personnel and site controls. The URS addendum to the RI Work Plan HASP for the site is provided in Appendix B.

Quality Assurance Project Plan and Confirmation Sampling

The QAPP, provided in Appendix C, specifies the removal action data quality objectives (DQOs) and the quality assurance and quality control (QA/QC) procedures required to achieve the objectives. Confirmation sampling collection procedures and the rationale for field screening are included.

Other Plans

The RA contractor will prepare the following plans as appropriate and as determined by DTSC; DTSC will approve the plans before field activities begin.

- The Transportation Plan (Appendix D) will identify the haul route for off-site disposal of waste.
- The Air Monitoring Plan (Appendix E) will describe perimeter and personal air monitoring efforts.

- The Excavation/Dust Control Plan will identify the RA contractor's schedule for site activities. It will present: the contractor's approach to the removal of debris and the excavation and stockpiling of soil; traffic patterns on site during field activities; methods for maintaining the separation of clean and contaminated soil; details for vehicle decontamination stations, which will prevent tracking soils off site and cross-contamination of clean soils on site; and staging areas for equipment, stockpiling, and loading of transport vehicles.
- The Spill and Discharge Plan will describe the RA contractor's plan in the event of a spill.
- The Stormwater Pollution Prevention Plan (SWPPP) will describe best management practices to control stormwater run-on to minimize flow into the excavations and to control runoff from the removal areas.
- The Security Plan will identify means and methods for ensuring site security during removal action activities.

6.1.2 Permits and Notifications

The RA contractor will obtain permits before beginning the removal action. Since this is a DTSC action, no permits are anticipated from the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), the County Planning Department, or the Kern County Environmental Health Department, though there are notification requirements.

6.1.3 Pre-Mobilization Activities

Before beginning the field activities, the RA contractor will conduct waste profiling and underground utility clearance, and the oversight contractor will conduct baseline perimeter air monitoring.

Waste Profiling

The RA contractor will identify nearby hazardous and nonhazardous waste disposal facilities and will obtain waste material acceptance agreements as appropriate before beginning the removal action. The RA contractor will submit copies of analytical reports from previous site investigation activities; if needed, the contractor will collect additional samples for analysis as requested by the disposal facility. The contractor will be responsible for preparing manifests for signature and for maintaining copies of the signed manifests on site.

Underground Utility Clearance

The RA contractor will be responsible for identifying and confirming the location of buried utilities. This includes contacting Underground Service Alert (USA) at least 48 hours before starting excavation activities.

Perimeter Air Monitoring

Perimeter air monitoring will be conducted by the oversight contractor, as outlined in Appendix E. Baseline air monitoring will be initiated the week before field activities begin.

6.2 MOBILIZATION AND SITE PREPARATION

The following section describes the mobilization and site preparation activities to be conducted by the RA contractor.

6.2.1 Mobilization

The RA contractor will provide all personnel, equipment, and materials to perform the removal action described in this document. All equipment brought onto the site will be clean and in good working condition.

6.2.2 Horizontal and Vertical Controls and Delineation of Excavation Areas

Before work begins, the RA contractor will be responsible for establishing horizontal and vertical controls at the site to control the extent of the excavation and allow the sampling team to collect samples readily and map sampling locations accurately. The excavation areas will be identified and marked as shown on Figure 6-1. The size of excavations for the contaminated areas are shown in Table 4-2.

6.2.3 Identification of Site Controls

The RA contractor will establish work zones around areas where work is being conducted. An exclusion zone (EZ) will be delineated and maintained around areas of elevated hazard. A contamination reduction zone (CRZ) will be established in clean areas upwind from site activities at the periphery of the work site, where appropriate. It will be relocated as deemed necessary. The support zone (SZ) will be a clean or uncontaminated area of the site outside of the EZ and CRZ. It will be used for support activities, such as equipment staging, test areas, sanitary facilities, and administrative tasks.

6.2.4 Fence Removal and Temporary Fence Installation

If needed, the RA contractor may remove permanent fencing from areas where it is expected to interfere with the removal action. The fence will be stored for reuse. During construction activities, temporary fencing may be installed to maintain site security. The security of contractor equipment will be the responsibility of the individual contractors.

6.3 FIELD DOCUMENTATION AND CUSTODY

6.3.1 Field Logbook

Documentation of field sampling and associated activities in the RA contractor's and oversight contractor's field logbooks will provide a permanent record that proper protocols were followed during implementation of the field sampling activities. All entries should be made in blue or black ink, and no erasures should be allowed. If an incorrect entry is made, the information should be crossed out with a single strike mark, and the change should be initialed and dated by the team member making the change. The information in the oversight contractor's field book should include the following, at a minimum:

- Project name and project number;
- Location of sample and sample number;

- Sampler's name and signature;
- Date and time of sample collection;
- Sample identification numbers and sample depth (if applicable);
- Description of samples and matrix sampled (composite or grab sample);
- Analysis to be performed;
- Description of QA/QC samples (if collected);
- Sample methods;
- Field observations; and
- Personnel present.

Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the collector's memory. The project manager or designee will be responsible for documenting appropriate field activities. The person making the entry will sign below it. One logbook may be used by multiple people to document the work at the site. All samplers will be listed individually and sign each day that they make entries into the book.

6.3.2 Photographs

Photographs should be taken during field activities to support written descriptions of sampling activities, soil removal, etc. The photographs should be recorded in the field logbook, including when the photograph is taken (date, time), weather conditions (if applicable), subject, purpose, film roll exposure number, and photographer's name. Information recorded in the field book should be transferred to the back of the photograph and into a photograph log, which should be incorporated into the final report.

6.3.3 Sample Number System

A sample numbering system should be established and used to identify each sample collected and submitted for analysis. The purpose of the numbering system is to assist in tracking samples and retrieving analytical results. The sample identification numbers for each sampling effort should be used on sample labels, sample tracking matrix forms, chain-of-custody forms, field logbooks, and all other applicable documentation. A listing of all sample identification numbers should be recorded in the field logbook. The sample numbering system may vary, depending on the number and type of samples to be collected. Each sample collected must be assigned a unique sample number. Sample numbers should change when the medium or location changes. Sample numbers should not change because different analyses are requested.

6.3.4 Sample Labels

All sample labels should be filled out with indelible ink and numbered uniquely. Labels may be partially completed before sample collection. The date, time, sampler's initials, and sample identification number should not be completed until the time of sample collection. At a minimum, each label must contain the following information:

- Project name;

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Figure 6-1. Removal Action Location Map
Osage Industries Site, Rosamond, CA

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- Sampler's company affiliation;
- Date and time of sample collection;
- Sample depth;
- Sampler's initials;
- Sample identification number;
- Analyses required; and
- Preservatives used.

6.3.5 Chain-of-Custody Procedures

This section briefly describes the procedures for sample documentation using the chain-of-custody protocol. Chain-of-custody procedures provide documentation of the handling of each sample from the time it is collected until it is destroyed. Chain-of-custody procedures are implemented so that a record of sample collection, transfer of samples between personnel, sample shipping, and receipt of the sample by the laboratory is maintained. The project manager or designee will be responsible for monitoring compliance with the chain-of-custody procedure. The sampler will be responsible for initiating and filling out the chain-of-custody form. The sampler will sign the chain-of-custody form when relinquishing the sample to anyone else. It is not necessary for the courier to sign the chain-of-custody form; however, the airbill number will be noted on the chain-of-custody form and retained by the sample handler for tracking purposes. A chain-of-custody form contains the following information:

- Sampler's signature;
- Project number;
- Date and time of collection;
- Sample location;
- Sample identification number;
- Sample type/matrix;
- Preservative used, if any;
- Analyses requested;
- Number of containers;
- Signature of persons relinquishing custody, with dates and times;
- Method of shipment and airbill number, when shipped; and
- Signature of persons accepting custody, with dates and times (laboratory receiving samples).

The field team members are responsible for the care and custody of the samples until they are transferred to another party, dispatched to the laboratory, or disposed. A sample is considered to be under custody if one or more of the following criteria are met:

- The sample is in the sampler's possession;

- The sample is in the sampler's view after being in possession;
- The sample was in the sampler's possession and then locked up to prevent tampering; or
- The sample is in a designated secure area.

An example of a chain-of-custody form is shown on Figure 6-2.

6.3.6 Transfer of Custody and Shipment

When transferring the possession of samples, the individuals relinquishing and receiving should sign, date, and note the time in the appropriate space on the custody paperwork. When shipping samples by overnight courier, the individual in possession of the samples relinquishes the samples by signing, dating, and noting the time and completing the Received By box with the courier name and air bill number.

All shipments will be accompanied by the appropriate custody and analyses specification document(s) identifying the shipment container's contents and the analyses needed for each sample. The original documents will be sealed in a plastic bag and placed securely in the ice chest.

The following information will be conveyed to the laboratory when samples are shipped:

- Date shipped;
- Number of samples and sample matrices;
- Carrier and air bill number; and
- Next planned shipment.

The laboratory will be notified at least 24 hours in advance of Friday and Saturday sample deliveries, if necessary.

Upon receipt at the laboratory, the designated laboratory sample custodian must sign the chain-of-custody form indicating receipt of the incoming field samples. The samples must be checked against the chain-of-custody form upon arrival at the laboratory. The receiving personnel will properly document the receipt of all arriving samples and note any problems or discrepancies regarding the sample container, chain-of-custody forms, and sample cooler contents, and they will record the temperature of the temperature blank and seal conditions on the sample receipt form. Any problem or discrepancy will be reported immediately to the project manager. In conjunction with the laboratory reports, a copy of the chain-of-custody form and the sample receipt form must be returned to the project manager for inclusion in the central project file.

6.4 FIELD ACTIVITIES

Field activities, with the exception of perimeter air monitoring and confirmation soil sampling, is the responsibility of the RA contractor.

CHAIN OF CUSTODY RECORD

USE A BALLPOINT PEN AND PRESS FIRMLY
THE INSTRUCTIONS FOR FILLING OUT
THIS FORM ARE ON THE BACK

URS

2870 GATEWAY OAKS, SUITE 300
SACHRAMENTO, CA 95833
PH. (916) 679-2000
FAX (916) 679-2900

09302

TASK OR SUB TASK (one per form):	LABORATORY NAME AND ADDRESS:
CONTRACT NAME:	
CHARGE NUMBER:	

SAMPLE NUMBER	COLLECTION DATE	COLLECTION TIME	SAMPLER'S INITIALS	NUMBER OF UNITS	UNIT QUANTITY	MATRIX CODE	PRESERVATIVE	TYPE OF ANALYSIS	QC

DO NOT WRITE IN THIS AREA

THE INFORMATION IN THIS SECTION WILL NOT BE AVAILABLE TO THE LABORATORY

LOCATION	DEPTH	QC CODE

RELEASED BY	DATE	TIME	COMMENTS:
	/ /	:	

RECEIVED BY	DATE	TIME	RELINQUISHED BY	DATE	TIME
	/ /	:		/ /	:
	/ /	:		/ /	:
	/ /	:		/ /	:
	/ /	:		/ /	:
	/ /	:		/ /	:

DISPOSAL CONFIRMED BY	DATE	TIME	CHAIN-OF-CUSTODY RETURNED BY	DATE	TIME
	/ /	:		/ /	:

SAMPLING COMMENTS:

WHITE - COORDINATOR / GOLDENROD - PROJECT DIRECTOR / PINK - SAMPLE CONTROL / YELLOW - LABORATORY / BLUE - LABORATORY RECEIPT

DTSC\Osage\12-05-COC-form.cdr - VMG 12/02/05 SAC

Figure 6-2. Chain of Custody Form
Osage Industries Site, Rosamond, CA

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6.4.1 Excavation

Approximately 92 cy of soils exceeding the cleanup goals listed in Table 4-1 will be excavated and stockpiled or loaded directly into vehicles for transport off site. Because of the high lead concentrations, it is likely that this soil will be classified as RCRA hazardous waste. At least one sample should be collected for TCLP lead analysis.

6.4.2 Cultural Resource Considerations

Although cultural resources have not been identified at the site, the proposed project may impact significant cultural resources during the excavation of soils for backfill. To ensure that potentially significant cultural resources are not impacted, the contractor will have to take into account the following mitigation measures.

- An archaeological assessment should be conducted for the project if prehistoric human relics are found that were not previously assessed during the environmental assessment for the project. The site must be formally recorded, and archaeologists' recommendations must be made to the Lead Agency regarding further site investigations or site avoidance or preservation measures.
- If animal fossils are uncovered, the Museum of Paleontology at U.C. Berkeley must be contacted to obtain a referral list of recognized paleontologists. An assessment must be conducted by a paleontologist and, if the paleontologist determines the material is significant, it must be preserved.
- The proposed project will comply with Section 7050.5 of the California Health and Safety Code, which prohibits the disturbance of human remains outside of a formal cemetery.

6.4.3 Confirmation Sampling

Confirmation sampling is the responsibility of the oversight contractor. Confirmation samples will be collected from beneath the soil and analyzed in accordance with the protocols outlined in Section 6.5, Confirmation Sampling.

6.4.4 Transportation and Disposal of Materials

Soil and debris must be accepted at a disposal facility before field activities begin. Once accepted, the excavated soil can be loaded directly into trucks for transport to the disposal facility. Excavated soil and debris will be loaded into highway-legal transport vehicles that are plastic-lined, if required. Decontamination procedures will be followed, as necessary, to prevent the tracking of contaminated materials from trucks onto local rights-of-way or previously remediated areas. As required by the SJVUAPCD, all trucks will be covered with tarps during transportation.

Safety Kleen in Buttonwillow, California, has been identified as a potential disposal facility for hazardous materials. This facility also will accept debris less than 3 inches in diameter in the RCRA hazardous stream and debris less than 3 feet in size for the non-RCRA hazardous waste stream.

Material removed from the site will require manifesting. Hazardous waste manifests will be required for any hazardous waste, and a bill of lading or waste generation manifest will be required for the non-hazardous waste. Manifests will be prepared by the contractor and will be signed by the DTSC representative or a designated contractor. The contractor will maintain manifests on site and provide signed manifests to the truck drivers during loading and before they leave the site.

6.4.5 Excavation Mapping

The RA contractor will be responsible for mapping the vertical and/or lateral extent of additional excavation. Any additional excavation areas will be defined, mapped, and discussed with regulatory oversight personnel.

6.4.6 Backfill and Compaction

All remediation excavations will be backfilled with clean soil excavated from an uncontaminated area of the site and compacted to 90% relative compaction. The soil used for backfill will be sampled at a frequency of one sample per 500 cy of soil and submitted to a certified laboratory for metals, petroleum, and semivolatile organics analysis to ensure that the soil is clean. The site will be graded to mesh with the surrounding ground surface.

6.5 CONFIRMATION SAMPLING

Confirmation soil sampling activities will be conducted by the oversight contractor with assistance from the RA contractor to monitor the attainment of cleanup goals.

- A certified laboratory will be used for all analyses. Most of the samples will be collected for the analysis of arsenic, cadmium, and lead. Only one sample from the furnace will be tested for dioxins/furans. No more than 10% of samples also will be submitted for CAM metals analysis, if necessary for closure.
- Confirmation soil samples, to demonstrate that the industrial and RCRA hazardous waste criteria are met, will be collected at the following frequencies: excavation bottom samples will be collected at a frequency of one per 50-foot by 50-foot area; and excavation wall samples will be collected at a frequency of one per 50 linear feet, or a minimum of one sample per wall for smaller excavation areas.
- The number of samples included, for costing purposes, assumes that 100% of the sample locations will require additional excavation and sampling and that there is a 10% field duplicate QC requirement.
- Soil samples will be collected at a frequency of one sample per 500 cy of RCRA hazardous waste for waste classification purposes.

6.5.1 Analytical Methods

The certified laboratory will conduct metals and dioxins/furans analyses using the following methods:

- Arsenic, cadmium, lead, and other CAM metals (if needed for site closure) by EPA Method 6010B; and
- Dioxins and furans by EPA Method SW8290.

If a sample concentration exceeds 10 times the respective soluble threshold limit concentration (STLC) for a metal, a leachate sample should be prepared using the California WET and analyzed accordingly.

In addition, an adequate amount of soil from all sample locations should be held for future analysis for CAM metals in support of the risk assessment calculations that will be conducted to justify site closure.

6.5.2 Sample Collection Methodology

Soil samples from the bottom and sidewalls of the excavation will be obtained using a backhoe or a hand sampler. Sample collection from the excavator bucket will require coordination with the RA contractor and will follow the protocol discussed hereafter.

The backhoe bucket will be used to retrieve a full bucket of soil from the required sample depth and location. The backhoe operator will be instructed to collect a "block" of soil from the face or bottom of the excavation to ensure that the most undisturbed sample possible is collected. The backhoe operator will operate the hoe so that the "block" rotates or slumps as little as possible while the soil is being lifted from the excavation. If slough or disturbed soil is brought up in the bucket, the field scientist will determine whether it is appropriate to instruct the backhoe operator to discard that bucket and collect another bucket from the undisturbed face or bottom of the excavation.

At each sample location, the field scientist will don a pair of clean chemical-resistant gloves. The sample will be collected from the undisturbed portion of the soil in the backhoe bucket with a clean trowel and placed into one or two clean 8-ounce glass jars. A sufficient volume will be collected for screening and confirmation analysis at each location. The container will be labeled and placed inside a resealable plastic bag. The sample label attached to each container will identify the date the sample was collected and provide a unique identification number and other identifying information.

Soil samples will be placed in a thermally insulated container with ice and shipped to a California-certified hazardous waste testing laboratory using the appropriate chain-of-custody procedures.

Prior to and between the sampling intervals, light equipment, such as tools, will be decontaminated using clean water and a mild soap, such as liquinox. The backhoe bucket will be dry-decontaminated between samples and steam cleaned at the end of the project; the bucket will be scrubbed using brushes and scrapers. The sampling equipment will be rinsed with tap water and finally with fresh distilled water. Decontamination of sampling equipment and the use of clean sample containers between samples is required to prevent cross-contamination. All decontamination liquids and rinseate will be contained and allowed to evaporate.

QA/QC samples will be collected according to the QAPP for the site. Generally, one duplicate sample will be collected for every 10 samples collected. Equipment blanks will be collected as appropriate to verify decontamination procedures for reusable sampling equipment.

If the screening or confirmation analytical results indicate that further excavation is required, additional excavation will be conducted, and additional samples will be collected for confirmation.

6.6 SAMPLE NUMBERING

All samples must be identified uniquely to ensure that results are reported and interpreted properly. Sample numbers will be assigned in sequential order. Sample locations should follow a predetermined convention, such as the following:

SITE NAME – SAMPLE LOCATION – SAMPLE DEPTH

where

Site Name = Osage

Sample Location will be:

- Confirmation Samples, floor = CF – Area
- Confirmation Samples, wall = CW – Area
- Equipment Blank = add "E" after the sample depth
- Duplicate = add "D" after the sample depth

where

Area = Area where sample is collected (e.g., ash pile 1).

Sample Depth = The uppermost depth where the sample was collected at this sample location (e.g., if the sample was collected at 0.5 to 1 foot bgs, the depth is 0.5 foot bgs). Baseline for depth measurements will be site elevation before work begins. The only exception to this baseline is for samples collected beneath stockpiles, where the baseline is the approximate ground surface elevation beneath the stockpile.

Example Sample Location

- Osage – CF – Ash pile 1 – 0.5. This sample is from a confirmation floor sample collected in ash pile 1 at 0.5 foot bgs.

6.7 SAMPLE-HANDLING PROCEDURES

Sample-handing procedures for samples submitted to the certified laboratory ensure that samples arrive at the laboratory intact, at the proper temperature, and free of external contamination. Samples will be shipped to the analytical laboratory via overnight carriers according to DOT standards. Chain-of-custody procedures will be followed during transport.

Any samples defined as hazardous materials will be packaged and shipped in accordance with requirements defined in 40 CFR 49, Chapter 1, Part 171. These requirements detail the proper classification and identification procedures for transporting hazardous materials.

When samples are required to be stored at 4°C or less, generous amounts of ice will be packed with the samples. The ice will be contained in Ziplock® bags and placed so that it is in direct contact with the sample to maintain temperature. When the samples are delivered to the laboratory, they will be placed in the sample control cooler immediately after log-in.

The following procedures will be used to prevent soil sample container breakage and cross-contamination.

- Each soil sample will be placed in an individual Ziplock® bag and placed in a hard plastic cooler.
- The coolers will be taped shut and sealed with chain-of-custody tape to prevent accidental opening.
- Samples that are known or suspected to be highly contaminated (based on field screening or observation) must be packaged and shipped separately from other samples.
- Laboratory sample controller must be notified by the sampler before any known or suspected highly contaminated samples are shipped. These samples will be stored separately from less-contaminated samples to minimize the potential for cross-contamination.
- Prior to sealing the cooler, the chain-of-custody form will be signed off, noting the method of shipment with the control number in the Received By column, placed in a Ziplock® bag, and taped to the under-side of the cooler lid.

6.8 SITE RESTORATION

Site restoration will include the removal of any waste streams generated by removal activities, the reinstallation of any permanent fencing (if applicable), and the removal of temporary fencing and any temporary facilities.

6.9 REPORT PREPARATION AND SUBMITTAL

A report of the removal action, certified by a California-registered professional engineer or geologist, should be prepared and submitted to the oversight agencies. The report will request oversight agency review and written verification from the oversight agency reviewers that the removal action is complete. This report will describe all removal activities and supporting documentation as follows:

- A summary of all field activities completed, including excavation, loading, dust control measures, transportation, disposal, confirmatory sampling analytical results, backfill and compaction, and site restoration;
- A summary of the volumes of contaminated material excavated and disposed;
- Copies of the chain-of-custody forms, laboratory reports, waste transportation manifests, waste disposal forms, and weight tickets;
- Any variations to the approved RAWP; and
- A summary of materials sampling, backfill materials sampling and testing, and health and safety monitoring.

The final report also should present the depths and areas excavated in a graphic form, site photographs, quality control checks, and field notes.

6.10 SCHEDULE

All field activities are expected to be completed within three weeks after the start of field mobilization. Baseline air monitoring will be conducted the week before field mobilization. Soil excavation is expected to require an additional one to two weeks.

7.0 REFERENCES

Department of Toxic Substances Control (DTSC), 2003. *Arsenic Contamination at the S. R. Kilby Site, Rosamond, California, Kern County.* Letter to David Balgobin, URS Corporation Americas. October 27.

EPA, 1988. *Guidance for Conducting Removal Investigations and Feasibility Studies Under CERCLA*. EPA Office of Emergency and Removal Response, Washington D.C. October. EPA/540/G-89/004.

_____, 1991. *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions.* Memorandum from EPA Assistant Administrator Don R. Clay. April 22.

URS Corporation Americas (URS), 1993. *Federal Facility PA Review, Site: Osage Industries, 60th Avenue West, Rosamond, California, Kern County.* September.

_____, 1994. *Federal Facility SI Review, Site: Osage Industries, 60th Avenue West, Rosamond, California, Kern County*. June.

_____, 2005. *Remedial Investigation Report, Osage Industries Site, Rosamond, California*. February.

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APPENDIX A

Alternative 3 Cost Estimates

TABLE A.1

CAPITAL COSTS
Alternative 3: Land Use Controls/Excavation/Removal/Off-Site Disposal

Item	Unit Cost	Capital Cost with Markups (w/o air monitoring)	Capital Cost with Markups (with air monitoring)
Alternative 3—Off-Site Disposal	$75,800	$75,800.00	$78,750.00
Bid Contingencies (5% of construction subtotal)		$3,790.00	$3,937.50
Scope Contingencies (10% of construction subtotal)		$7,580.00	$7,875.00
Construction Total		$87,170.00	$90,562.50
Engineering Design and Construction Oversight (5% of construction total)		$4,358.50	$4,528.13
Bonding and Insurance (3% of construction total)		$2,615.10	$2,716.88
Reporting (1% of construction total)		$871.70	$905.63
Fixed Fee (10% of construction total)		$8,717.00	$9,056.25
Total Capital Cost		**$104,000.00**	**$108,000.00**

TABLE A.2

Budget for Alternative 3, Land Use/Excavation/Removal/ Off-Site Disposal, Industrial Scenario

Item No.		Description	Amount	Units	Price per Unit ($)	Total Cost ($)
1.	**Surveyor Services**		2	visit	1,200.00	2,400.00
	a	Utility survey	1	acre	1,000.00	1,000.00
2.	**Excavation of Contaminated Soil, Off Site Disposal**					
	a	Site contractor mobilization/demobilization, including plans	1	ls	10,000.00	10,000.00
	b	Water for dust control - deposit to use fire hydrant	1	each	650.00	650.00
	c	Water for dust control - hydrant setup fee	1	each	35.00	35.00
	d	Water for dust control - cost for water	100	gal	1.56	156.00
		Volume to be excavated	5,913	cu ft		
	e	Excavation of contaminated soil and waste, temporary security fencing, and loading of waste into trucks for off-site disposal	219	cy	28.40	6,219.60
	f	Transport to off-site disposal facility	359	ton	23.00	8,260.68
	g	Disposal of California RCRA hazardous soil at Buttonwillow (Class I)	359	ton	190.00	68,240.40
	h	Kern County tax (10% disposal costs)	359	ton	19.00	6,824.04
	i	Board of Equalization tax	0	ton	43.06	0.00
	j	Fill (transported from on-site location)	323	ton	15.10	4,880.98
	k	Clean fill sample analysis	1	each	1,500.00	1,500.00
	l	Regrading	1	acre	500.00	500.00
3.	**Confirmation Sampling**					
	a	Confirmation sampling (lead, arsenic, cadmium)- regular TAT	60	each	57.00	3,420.00
	b	Confirmation sampling (metals) - regular TAT	10	each	160.00	1,600.00
	c	Confirmation sampling (dioxins/furans)- rush	2	each	2,400.00	4,800.00
	d	TCLP - regular TAT	5	each	90.00	450.00
4.	**Health and Safety and Perimeter Air Monitoring**					
	a	Air monitoring - equipment	1	mo	1,500.00	1,500.00
	b	Analytical – lead, arsenic, TSP, regular TAT	12	each	115.00	1,740.00
	c	Shipping	12	each	30.00	360.00
					Subtotal Capital Cost =	**$120,936**
					Subtotal Capital Cost (with perimeter air monitoring)	**$124,536**

cu ft = cubic foot
cy = cubic yard
ls = lump sum
mo = month
RCRA = Resource Conservation and Recovery Act
TAT = turnaround time
TCLP = toxicity characteristic leaching procedure
TSP = total suspended particulate

APPENDIX B

Health and Safety Plan (HASP) Addendum

HEALTH AND SAFETY PLAN (HASP) ADDENDUM

OSAGE INDUSTRIES SITE

Prepared For:

Contract No. 02-T2555 / Work Order No. 1-555-1.0-101534

California Environmental Protection Agency
Department of Toxic Substances Control
Northern California Region
1515 Tollhouse Road
Clovis, California 93611

Prepared By:

URS Corporation
2870 Gateway Oaks Blvd., Suite 150
Sacramento, California 95833

December 2005

URS HEALTH AND SAFETY PLAN ADDENDUM

For Use at Osage Industries

Disclaimer:

This Health and Safety Plan (HASP) Addendum, together with the original HASP (see Appendix B of the Osage Industries RI Work Plan dated 8/29/03) and each of its provisions, is applicable only to, and for use only by, URS Corporation, its affiliates, and its subcontractors. Any use of this HASP and Addendum by other parties, including, without limitation, third party contractors on projects where URS is providing engineering, construction management or similar services, without the express written permission of URS, will be at that party's sole risk, and URS Corporation will have no responsibility therefor. The existence and use of this HASP and Addendum by URS will not be deemed an admission or evidence of any acceptance of any safety responsibility by URS for other parties unless such responsibility is expressly assumed in writing by URS in a specific project contract.

Please contact the URS Office Health and Safety Representative or Regional Health and Safety Manager if you have any questions.

HEALTH AND SAFETY PLAN ADDENDUM

Osage Industries Signatures

PHONE NO.

Project Number: 17325502

Project Manager: Amir Matin 916-679-2398

HASP Addendum Preparer: Richard Moore, CIH 916-679-2089

Preparation Date: December 1, 2005

Expiration Date: June 30, 2006

APPROVALS

URS Regional Health and Safety Manager (HSM):

____
(DATE)

Project Manager:

____
(DATE)

This HASP Addendum is to be used for the specific work activities described herein. The addendum is to be used in concert with the Osage Industries HASP dated 8/29/03 and included as part of the RI Work Plan. Only those safety provisions related to activities presented in this addendum override those presented in the HASP. All other provisions of the HASP remain in effect, including, but not limited to: site history, personnel responsibilities, emergency/contingency plan, basic requirements, site control and security, training, and hazard assessments other than those specific to the work activities covered in this addendum.

TABLE OF CONTENTS

LIST OF TABLES
(Provided at the end of this appendix addendum)

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ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Assessment
AL	action level
APR	Air Purifying Respirator
cy	cubic yard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CNS	central nervous system
dBA	decibels A-scale
DTA	daily safety task analysis
DTSC	Department of Toxic Substances Control
GI	gastrointestinal (tract)
HASP	health and safety plan
HEPA	high efficiency particulate arrestor
H&S	health and safety
kg	kilogram
mg	milligram
MSDS	Material Safety Data Sheet
m^3	cubic meters
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PPE	personal protective equipment
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RA	remedial action
RI	remedial investigation
SMS	Safety Management Standard
SSO	site safety officer
TCLP	toxicity characteristic leaching procedure
THA	task hazard assessment

ABBREVIATIONS AND ACRONYMS (Continued)

TL	trigger level
TWA	time-weighted average
VOC	volatile organic compound
μg	microgram

APPENDIX B
HEALTH AND SAFETY PLAN ADDENDUM

B.1.0 PROJECT DESCRIPTION

Project Name: Osage Industries Field Dates: December 2005 to June 2006

Client: California Department of Toxic Substances Control

Site Address: 60th Street West Site, Rosamond, California, in Kern County

B.2.0 SCOPE OF WORK

The following tasks are associated with the removal and disposal of dioxin-contaminated soil during remedial activities at the Osage Industries site. All field activities are expected to be completed within three weeks after the start of field mobilization in late 2005 or early 2006. Baseline air monitoring will be conducted the week before field mobilization. Soil excavation is expected to require an additional one to two weeks.

- Excavation: Approximately 92 cubic yards (cy) of soils exceeding the cleanup goals listed in Table 4-1 of the Remedial Action Work Plan (RAWP) will be excavated and stockpiled or loaded directly into vehicles for transport off-site. Because of the high lead concentrations, this probably will be classified as Resource Conservation and Recovery Act (RCRA) hazardous waste. At least one sample should be collected for toxicity characteristic leaching procedure (TCLP) lead analysis.
- Excavation and Containerization of Contaminated Soil: The URS subcontractor will remove the top 3 inches of impacted soil around the 3 designated ash piles. The soil will be placed into a 20-cy plastic-lined container. URS personnel will oversee the subcontractor's activities to ensure that all impacted soil is removed to a depth of 3 inches.
- Furnace Dismantling and Sampling: The furnace will be dismantled and containerized by the remedial action (RA) contractor. Any ash deposits found within the furnace will be containerized separately with care. Two samples of the ash will then be collected by the oversight contractor for analysis for metals and dioxins/furans.
- Hazardous Waste Transportation for Off-Site Disposal: The URS subcontractor will lift and deposit the 1-cy plastic containers from the 3 ash piles onto transport vehicle(s) for off-site disposal at a licensed disposal facility. The subcontractor also will provide for the transport of the contaminated soil in the 20-cy lined container to an appropriate, licensed disposal facility. URS personnel will oversee the subcontractor's activities and control vehicular traffic in and out of the site and work areas.
- Confirmation Sampling: Soil will be sampled to ensure that cleanup levels have been attained and that no residual contamination exceeds the remediation goals for site soils. Confirmation samples will be collected from beneath the soil by the RA contractor and analyzed in accordance with the protocols outlined under Confirmation Sampling in Section 6.0 of the RAWP. The samples will be shipped overnight to an approved off-site laboratory for analysis.

- Cultural Resource Considerations: Although cultural resources have not been identified at the site, the proposed project may impact significant cultural resources during the excavation of soils for backfill. Therefore, to ensure that potentially significant cultural resources are not significantly impacted, the contractor will have to take into account the following mitigation measures.
  - An archaeological assessment should be conducted for the project if prehistoric human relics are found that were not previously assessed during the environmental assessment for the project.
  - If animal fossils are uncovered, the Museum of Paleontology, University of California at Berkeley, will be contacted to obtain a referral list of recognized paleontologists.
  - The proposed project will comply with Section 7050.5 of the California Health and Safety Code, which prohibits the disturbance of human remains outside of a formal cemetery.
- Transportation and Disposal of Materials: Soil and debris will be loaded directly into trucks for transport to the disposal facility. Excavated soil and debris will be loaded into highway-legal transport vehicles that are plastic-lined, if required. Decontamination procedures will be followed, as necessary, to prevent the tracking of contaminated materials from the trucks onto local rights-of-way or previously remediated areas. All trucks will be covered with tarps during transportation.
  - Safety Kleen has been identified as a potential disposal facility for hazardous materials. This facility also will accept debris less than 3 inches in diameter in the RCRA hazardous stream, and debris less than 3 feet in size for the non-RCRA hazardous waste stream.
  - Material removed from the site will require manifesting. Hazardous waste manifests will be required for any hazardous waste, and a bill of lading or waste generation manifest will be required for the non-hazardous waste. Manifests will be prepared by the contractor and will be signed by the Department of Toxic Substances Control (DTSC) representative or a designated contractor. The contractor will maintain manifests on site and provide signed manifests to the truck drivers during loading and prior to leaving the site.
- Excavation Mapping: The RA contractor will be responsible for mapping the vertical and/or lateral extent of any additional excavation. Any additional excavation areas will be defined, mapped, and discussed with regulatory oversight personnel.
- Backfill and Compaction: All remediation excavations will be backfilled with clean soil excavated from an uncontaminated area of the site and compacted to 90% relative compaction. The soil used for backfill will be sampled at a frequency of one sample per 500 cy of soil and submitted to a certified laboratory for metals, petroleum, and semivolatile organic analysis to ensure the soil is clean. The site will be graded to mesh with the surrounding ground surface.

URS will provide a copy of the Health and Safety Plan (HASP) and this HASP Addendum to the subcontractor(s) for informational purposes only. Once the subcontractor(s) have received the URS HASP and Addendum, they will be required to sign the URS Disclaimer, Waiver, Release, and Promise Not to Sue Form (see HASP Attachment 3). In addition, subcontractors will be required to participate in the project health and safety kickoff and tailgate safety meetings. Subcontractors will sign the Safety Orientation Record Form (see HASP Attachment 1B) stating that they have read and understand the Osage Industries HASP and HASP Addendum, have attended the project/task kickoff meeting, and agree to comply with its provisions throughout their work on the project.

B.3.0 HAZARD ASSESSMENT

As discussed in the HASP (see Section 3.0), potential hazards may exist during the course of the work activities described in Section 2.0. The potential hazards identified in the revised task hazard assessment (THA), included herein as a revised Table B.3-1, are intended to reflect those hazards associated with the work tasks identified in this Addendum. The HASP also provides an Activity Hazard Assessment (AHA) (see HASP Attachment 4A), and the Daily Safety Task Analysis (DTA) (see HASP Attachment 4B). These hazard assessment tools will continue to be used at the site in accordance with the provisions of the HASP (see HASP Section 3.0 for a discussion of the THA, AHA, and DTA). The applicable Safety Management Standards (SMSs) are referenced and described in the THA table. The SMSs are included as Volume II to the Osage Industries Remedial Investigation (RI) Work Plan and should be consulted for a description of those safe work procedures that are to be employed to mitigate the task-specific hazards that may be encountered at the work site. Work tasks and potential associated hazards associated with the proposed remedial and confirmation sampling activities are presented in the revised THA included in this Addendum. Excavation activities included in the THA consist solely of the removal of surface soils and trenching to less than a depth of 1 foot. The need for deeper trenches or deeper excavations is not anticipated.

It should be noted that it is reasonable to anticipate physical hazards (e.g., sample collection, heavy equipment operations, heat stress, noise, etc.), but exposure to potential chemical and biological hazards is not so clearly apparent or identifiable. Consequently, as discussed in the HASP, the site safety officer (SSO) will conduct a health and safety (H&S) kickoff meeting for URS and subcontractor personnel. The meeting will discuss potential chemical hazards and measures to be implemented to limit exposure to chemicals, principally the dioxins and furans present in the contaminated soils and waste materials at the ash piles. On-site personnel could be exposed to chemical hazards during the removal and transfer of contaminated soils to appropriate containers and during confirmation sampling. The principal exposure routes would be inhalation of contaminated airborne dust or particulates and dermal contact or incidental ingestion of contaminated soils and materials. Refer to the revised Table B.3-2, chemical hazards table, presented herein for a list of the potential work site chemical hazards and the permissible exposure limits (PELs) to which workers may be exposed repeatedly without violating regulatory exposure criteria. The chemical contaminants of primary concern at the site are presented in revised Table B.3-2.

Inhalation exposure to airborne dust/particulates resulting from the disturbance of contaminated soil or material is likely when workers are handling or disturbing the corroded drums or handling other contaminated materials and soils at the site. The corroded drums present the greatest hazard because they have the site's greatest contaminant concentrations of lead (66,100 milligrams per kilogram [mg/kg]), arsenic (1,400 mg/kg), and cadmium (707 mg/kg). Most of the remainder of the site has lower concentrations of contamination in site materials (e.g. the furnace, transformer, ash piles, etc.) and soils. Notable high concentrations include the following:

- Dioxins/furans in furnace ash (1.7 micrograms per kilogram [ug/kg]);
- Cadmium (166 mg/kg) in sample OS 1-0.5;

- Arsenic (253 mg/kg) and lead (9,520 mg/kg) in the transformer; and
- Beryllium (48.8 mg/kg) in sample SOP1-0.5.

Airborne concentrations of these non-volatile contaminants and materials may exceed the 8-hour time-weighted average (TWA) Occupational Safety and Health Administration (OSHA) or Cal/OSHA PELs or Action Levels (ALs) (see revised Table B.3-2). Based on the calculations presented in the Air Monitoring Plan (Appendix E), lead is the most significant hazard during activities involving the corroded drums or the disturbance of the other site materials and soils. However, given the different levels of contamination in these two distinct groups, two separate sets of trigger levels (TL) have been developed for working with either group. Group A encompasses any and all activities dealing with site materials and soils, excluding the handling or disturbing of the corroded drums. Group A activities have an airborne dust TL concentration of 1.58 milligrams per cubic meter ($mg/m^{3)}$. Group B encompasses any and all activities dealing with site materials and soils, including the handling or disturbance of the corroded drums. Group B activities have an airborne dust TL concentration of 0.23 mg/m^3. An exceedence of these TLs could result in a short-term exceedence of the lead AL of 0.03 mg/m^3, assuming a maximum lead concentration of 9,520 mg/kg detected in the transformer sample and 66,100 mg/kg detected in the corroded drum sample.

An airborne dust/particulate concentration that exceeds the appropriate TL is feasible when handling contaminated site materials and soils. Because of this, dust suppression techniques will be employed by the subcontractor and overseen by URS personnel. Workers will be required to wear half-face respirators with high efficiency particulate arrestor (HEPA) filter cartridges when conducting Group B activities (working with the corroded drums). This respirator requirement will be upgraded to full-face respirator if, at any time, there are visible airborne dust or particulate emissions or measured concentrations exceed approximately 5 times the TL for a half-face respirator. Respirator requirements can be mitigated for Group A activities if a real-time dust aerosol monitor is used to continuously measure airborne particulate concentrations and ensure that the appropriate TL of airborne dust in the workers breathing zone is not exceeded. Table B.3-3, provided at the end of this appendix, illustrates the appropriate level of respiratory protection for Group A and Group B activities, based on measured airborne particulate concentrations.

Dermal exposure and incidental ingestion of dioxin/furan and metals-contaminated soils (including, but not limited to arsenic, beryllium, cadmium, lead) also poses an exposure hazard. Consequently, subcontractor and URS personnel exposed to site soils will be required to wear appropriate personal protective equipment (PPE), including double-layer chemical-resistant gloves and disposable Tyvek. Thorough decontamination procedures also will be implemented to ensure that no contaminated PPE, equipment, or other materials leave the work site. Furthermore, the subcontractor will be responsible for implementing appropriate dust suppression methods during site activities.

Volatile organic compounds (VOCs), other than vehicular exhaust, have not been detected at the site or in site soils at potentially hazardous concentrations and are not expected to pose a chemical hazard.

Material Safety Data Sheets (MSDSs) for decontamination and other chemicals brought to the site (e.g., hexane, nitric acid, Alconox®, etc.), including MSDSs for gasoline, diesel, and grease and oil, will be maintained at the project work site (see HASP Volume II). Personnel are instructed to refer to this HASP and the appropriate MSDSs for information on the chemical hazards, PPE, and other special precautions (storage, handling, spill and leak cleanup procedures, and other details).

Dermal contact and possible incidental ingestion of nonvolatile organic and inorganic chemicals in site soils could occur during soil removal and confirmation sampling, while field personnel are handling contaminated soil and waste materials. Inhalation exposure to site contaminants during site activities is likely in the event that construction or other intrusive activities generate dust and potentially contaminated airborne particulates. High winds and soil-removal activities can result in airborne hazards. If removal operations or high wind conditions generate sustained visible dust, the subcontractor is required to implement dust suppression measures (e.g., application of water mist to the site to reduce/eliminate dust). To avoid dermal, inhalation, and incidental ingestion exposure, field personnel will wear appropriate PPE, including chemical-resistant gloves and coveralls (e.g., Tyvek) and respiratory protection (full- or half-face respirators equipped with HEPA cartridges). Workers who come into contact with wet soils will be required to wear Saranex®; when backsplash from soil wetting or decontamination activities is likely, a face-shield is required for at-risk workers. Workers will duct-tape the seams of their PPE clothing to gloves and boots to prevent soil debris from gaining dermal access. Workers without the proper PPE will not be permitted in the work areas.

B.4.0 BASIC REQUIREMENTS

Field activities will be conducted in accordance with Cal/OSHA and federal OSHA regulations and URS safety requirements as stated in the HASP (see HASP Section 4.0). URS and subcontractor personnel will adhere to the provisions of the HASP dealing with training, site control and security, decontamination procedures, and the revised site- and work-task-specific provisions described in the rest of this section.

B.4.1 Monitoring Equipment

Air monitoring equipment will include an MIE Data RAM (or equivalent), and two industrial hygiene sampling pumps, as discussed in Appendix E (Air Monitoring Plan). The SSO will visually monitor site conditions throughout field activities and determine the need for monitoring equipment (i.e., aerosol monitoring) in the event of changing conditions that result in potential exposure hazards or if site workers wish to downgrade respiratory protection. The SSO will record visual observations in the field logbook.

B.4.2 Trigger Levels

TLs are described in Appendix E (Air Monitoring Plan). In addition, if real-time monitoring instrumentation is not available to assess airborne particulate concentrations, then visible dust above the knee automatically will require that all on-site workers don respiratory equipment (half- or full-face respirator) equipped with HEPA cartridges. In addition, the subcontractor will be required to implement sufficient dust suppression measures to thoroughly control airborne dust throughout field activities.

B.4.3 Disposition of Decontamination Wastes

All disposable PPE, equipment, plastic sheeting, and other items will be placed in plastic trash bags for disposal. These items are not considered hazardous waste and do not require disposal at a hazardous waste disposal facility. Spent equipment decontamination wash water, rinse water, and rinseate will be collected and contained in appropriate-sized containers pending any required chemical analyses to determine their ultimate disposition, in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and DTSC requirements.

B4.4 Health and Safety Equipment

The following equipment will be provided for work at the site. Subcontractors will provide the equipment for their personnel (R = Required, A = Available)

R Hard Hat	R Eye Protection: Safety Glasses with Side Shields
R Hearing Protection	R Nitrile Gloves for Handling Hazardous Waste/Material
R Steel-Toed Boots	A Chemical-Resistant Steel-Toed Boots
R Orange Safety Vest	A Respirator (Type) Half- and Full-Face Air Purifying Respirator (APR)
A Tyvek Coveralls	A APR-Specific HEPA Cartridges
R First Aid Kit	R Fire Extinguisher
R Eye Wash Solution	R Portable Toilet (or easily accessible off-site facilities)

R Potable On-Site Water (or available source)
A Face-Shield (required when backsplash from soil wetting or decontamination activities is likely)

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	**NA**	**A**	**NA**	**NA**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
Biological Hazard	**Biological Hazard Rating →**	**Low**	**Low**	**Med**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Snakes, rodents, insects (SMS 047)	1. Provide awareness training to all site workers on local biohazards, their recognition, avoidance, control, and treatment. 2. Keep storage, laydown, and segregation areas clean and eliminate places of refuge. 3. Be aware that water supply may attract vectors.	**X**					**X**	**X**	**X**		**X**	**X**	**X**
Chemical Hazard	**Chemical Hazard Rating →**	**Low**	**Med**	**Med**	**Low**	**Low**	**Med**	**Low**	**Low**	**Med**	**Low**	**Med**	**Low**
Inhalation/dermal contact w/ volatile organic compounds (VOCs) 1. Equipment fuel and exhaust gas VOCs 2. Site contaminants 3. Decontamination and cleaning products	1. Continuously assess respiratory hazards using real-time instruments for VOCs and or particulates at all work sites, excavations, stockpiles, and sample sites. 2. Use appropriate PPE. 3. Store solvents to be used for cleaning or decontamination in the original container until they are used in the field. (If they are transferred to another container for field use, the container must be either glass or Teflon.)			**X**			**X**	**X**		**X**		**X**	

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	**NA**	**A**	**NA**	**NA**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
Semivolatile organic compounds (SVOCs) and metals	1. Use dust suppression techniques (e.g., water spray). 2. Use appropriate PPE.			**X**			**X**	**X**					
On-site chemicals	1. Maintain a comprehensive list of all chemicals on site. 2. Store chemicals in manufacturers' containers or approved equivalent. 3. Store chemicals in approved chemical cabinets (e.g., flammable, acid, corrosive). 4. Read and follow directions provided by MSDS (see Volume II). 5. Transport only the quantity necessary to complete the required activities. 6. Dispose of any unused acids according to California and local ordinances. 7. Properly dispose of all solvents and acids as investigation-derived waste.	**X**					**X**			**X**			
Inhalation/dermal contact particulate	1. Use dust suppression techniques (e.g., water spray) 2. Use appropriate chemical-resistant PPE.			**X**			**X**			**X**			
Direct contact with soil	Use appropriate chemical-resistant PPE.			**X**			**X**			**X**			

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	**NA**	**A**	**NA**	**NA**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
All chemical hazards	1. Do no intrusive work in contaminated areas without appropriate protection. 2. Keep contact with soils and debris to a minimum. 3. Ensure proper personal decontamination procedures are followed. 4. Perform periodic real-time monitoring. 5. Wear appropriate PPE.	**X**		**X**					**X**	**X**	**X**	**X**	**X**
Corrosives, reactives, acids, and bases	1.Observe and manage suspect containers. 2.Wear appropriate PPE (splash shield and goggles, chemical resistant gloves, etc).						**X**	**X**		**X**			
Physical Hazard	**Physical Hazard Rating →**	**Med**	**Med**	**Med**	**Med**	**Med**	**Low**	**Med**	**Med**	**Low**	**Med**	**Med**	**Med**
Electrical (SMS 012)	1. Assure qualified electricians perform electrical work. 2. Require ground fault circuit interrupters when using electric tools.	**X**									**X**		**X**
Lockout/tagout (SMS 023)	Follow lockout/tagout procedures.	**X**		**X**									**X**
Utility clearance (SMS 034)	Identify utilities prior to excavation.	**X**		**X**									
Fall from elevation (SMS 040)	Implement fall protection measures for work at greater than 6 feet above ground.	**X**											**X**
Portable ladders (SMS 028)	Follow SMS 028 guidelines.	**X**											
Hand tools and portable equipment (SMS 016)	1. Inspect all tools prior to use. 2. Inspect equipment daily.	**X**		**X**			**X**	**X**				**X**	

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	NA	A	NA	NA	A	A	A	A	A	A	A
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
	3. Maintain machine guards in-place.												
Heat stress (SMS 018)	1. Train workers on heat stress. 2. Provide shaded work areas as needed. 3. Allow for frequent water breaks and rest periods. 4. Implement work/rest schedule when action level is exceeded.	**X**		**X**			**X**	**X**	**X**		**X**	**X**	**X**
Heavy equipment operation (SMS 019)	1. Inspect all heavy equipment prior to use. 2. Use only qualified operators. 3. Identify travel routes to avoid other operations. 4. Conduct tailgate safety meetings daily to communicate changes in operations. 5. Have pre-agreed upon travel routes and ramps as excavation and waste transport proceed. 6. Operators and foot traffic establish frequent eye contact and acknowledge eye contact with equipment operator and vehicle drivers.	**X**		**X**			**X**	**X**	**X**		**X**		**X**
Lifting/back injury (SMS 064)	1. Use proper lifting techniques. 2. Seek assistance when moving heavy or awkward loads.	**X**		**X**			**X**	**X**				**X**	**X**

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	**NA**	**A**	**NA**	**NA**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
Motor vehicle accident (SMS 057)	1. Drivers comply with all traffic laws. 2. Require commercial driver's license for the operator of vehicles >26,000 pound gross vehicle weight. 3. Always require seat belts.	**X**		**X**					**X**		**X**		**X**
Work zone traffic control (SMS 032)	1. Use traffic controls when moving equipment onto the site. 2. Identify equipment and personnel travel routes and adjust them as work progresses. 3. Always require seat belts.	**X**		**X**				**X**	**X**		**X**		**X**
Noise (SMS 026)	1. Make hearing protection available and use it for activities where verbal communication is compromised at distances of 3 feet or less. 2. Conduct noise monitoring as necessary or assume that noise levels in high noise areas or equipment exceed 85 decibels A-scale (dBA).	**X**		**X**				**X**	**X**		**X**		**X**
Slip, trip, fall (SMS 021)	1. Conduct daily housekeeping inspections. 2. Fill or cover holes to reduce slip, trip, and fall hazards.	**X**		**X**			**X**	**X**	**X**		**X**	**X**	**X**

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	**NA**	**A**	**NA**	**NA**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
Fire prevention (SMS 014)	1. Place fire extinguishers adjacent to excavation area based upon unknowns. 2. Equip all vehicles with a current and operational fire extinguisher. 3. Conduct periodic inspections of the site for possible spontaneous ignition of unknowns due to disturbance or reactions.			**X**				**X**					**X**
Excavation hazards (SMS 013)	Since no trenches or excavations >4 feet are anticipated, hazards relate only to the operation of heavy equipment and worker contact.			**X**									

TABLE B.3-1 (Revised)

Task Hazard Assessment (THA) Addendum
Osage Industries – Removal and Confirmation Sampling Activities

		Task Descriptions and Applicability (A= applicable to project, NA= not applicable to project)											
		A	**NA**	**A**	**NA**	**NA**	**A**	**A**	**A**	**A**	**A**	**A**	**A**
Potential Hazard	**Control Measures**	Mobilization	Drilling Activities	Excavation Activities	Activities Near, On, or Over Water	System Operation	Sample Collection	Material Loading & Transportation	Site Traffic	Cleaning Activities	Water Controls	Decontamination	Demobilization, Restoration
PPE and Respiratory Protection (SMSs 029, 042)													
Level D	1. There is no known or anticipated exposure to site contaminants or chemical hazards. 2. The site is known and confirmed to have chemical concentrations below clean-up criteria and occupational exposure criteria.	**X**							**X**		**X**		**X**
Modified Level D PPE includes chemical resistant gloves Tyvek coveralls	Non-VOC contaminants are known to be present in soil.			**X**			**X**	**O**	**O**	**X**		**X**	
Level C PPE (upgrade respiratory protection; dependent on visible dust or real-time data)	Upgrade to air purifying respirators (APRs), half- or full-face, with HEPA cartridges.			**O**			**O**			**O**		**O**	

X Denotes that potential hazards and control measures are applicable to the given task.
O Denotes that the potential hazard may require an upgrade in PPE for the given task.

dBA decibel A-scale
HEPA high efficiency particulate arrestor
MSDS Material Safety Data Sheets
PPE personal protective equipment
SMS Safety Management Standards (included as Volume II to the Osage Industries HASP; see Appendix B of the Osage Industries RI Work Plan, August 2003)

TABLE B.3-2 (Revised)

Chemical Hazards

Chemical Name	Cal/OSHA PEL or [AL] (mg/m^3)	Maximum Concentrations (mg/kg) Site Materials [Corroded Drums]	Chronic Health Hazards/ Target Organs	Symptoms of Overexposure
Lead	0.05 [0.03]	9,520 [66,100]	Multiple organs and systems: blood, cardiopulmonary, GI, kidney, liver, CNS, skin.	Decreased mental ability, weakness (especially in hands), headache, abdominal cramps, diarrhea, and anemia; affects blood-forming organs, kidneys, and peripheral nervous system.
Beryllium	0.002	48.8	Eyes, skin, respiratory system / Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation of eyes; dermatitis.	Inhalation: eye, skin, nose, throat, mouth irritant, coughing, dizziness, shortness of breath; ingestion and dermal contact: headache, nausea, diarrhea, cramps; long-term exposure: nasal ulcers, damage to kidney and liver.
Arsenic	0.01 [0.005]	253 [1,400]	Skin, lung, liver, nasal septum, skin, GI tract (diarrhea), tremors, seizures, reproductive toxicant	Chronic arsenic poisoning is characterized by weakness, loss of appetite, GI disturbances, numbness and tingling of the extremities (peripheral neuritis). Chronic exposure to arsenic compounds, such as arsenic trioxide, may lead to liver damage and skin disorders, such as keratosis and pigmentation.
Cadmium	0.005 [0.0025]	166 [707]	Inhalation: respiratory system, kidneys; ingestion: kidneys, GI tract irritation	Kidney: renal tubular proteinuria; lung: irritation, emphysema, exhaustion; GI tract: nausea, vomiting, abdominal cramps
Nuisance Particulates (Airborne dust)	5 (resp) 10 (total)	NA	Eyes, skin, respiratory system	Irritation of eyes, skin, throat, upper respiratory system
Dioxins/Furans	NE for all, some are set at 10	0.00174	Eyes, skin, liver, kidneys, reproductive system	Irritation of eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; in animals: liver, kidney damage, hemorrhage.

AL = action level
CNS = central nervous system
GI = gastrointestinal (tract)
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
NA = not applicable
NE = none established
OSHA = Occupational Safety and Health Administration
PEL = permissible exposure limit
resp. = respirable (fraction)

TABLE B.3-3

Respiratory Requirements

Activities	No Respirator [a]	Half-face Respirator [a]	Full-face Respirator @ 5 Times the TL [a]	Stop Work @ 25 Times the TL [a]
Group A (w/o Drums)	< 1.58 mg/m^3	> 1.58 mg/m^3 < 7.9 mg/m^3	> 7.9 mg/m^3	> 39.5 mg/m^3
Group B (w/ Drums) [b] Worker exposure sampling required	< 0.23 mg/m^3 [c] (calculated) Not an option, half-face respirator required at a minimum for this task	< 1.15 mg/m^3	> 1.15 mg/m^3	> 5.75 mg/m^3

[a] Measured (by real-time particulate monitor) airborne particulate concentrations in the worker's breathing zone.
[b] NIOSH sampling method 7300 for lead, arsenic, and cadmium to be conducted with the most at-risk worker handling the corroded drums.
[c] Though it is feasible that airborne exposures may be kept below the TL of 0.23 mg/m^3 for airborne particulates, as a good management practice, workers with direct handling responsibilities for Group B activities with the drums will be required to wear half-face respiratory protection and conduct continuous real-time monitoring. In the absence of continuous real-time monitoring, Group B workers will be required to wear full-face respiratory protections.

mg/m^3 = milligrams per cubic meter
NIOSH = National Institute of Safety and Health
TL = trigger level

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APPENDIX C

Quality Assurance Project Plan

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ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
CAM	California Assessment Manual
COC	contaminants of concern
DI WET	Deionized Water Waste Extraction Test
DQI	data quality indicator
DQO	data quality objective
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
LCS	laboratory control sample
MS	matrix spike
MSD	matrix spike duplicate
OSHA	Occupational Safety and Health Administration
PARCC	precision, accuracy, representativeness, comparability, and completeness
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RAO	removal action objective
RAWP	removal action work plan
RPD	relative percent difference
RSD	relative standard deviation
STLC	soluble threshold limit concentration
TCLP	toxicity characteristic leaching procedure
URS	URS Group, Inc.

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APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

This quality assurance project plan (QAPP) presents the functions, procedures, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality objectives (DQOs) for the Osage Industries Site (site) Removal Action Work Plan (RAWP); it is subject to Department of Toxic Substances Control (DTSC) approval. This QAPP is organized according to the QAPP elements listed in the U.S. EPA's *Guidance for Quality Assurance Project Plans* (2002), with the following exceptions. Required QAPP elements, such as project management, title and approval sheet, table of contents, distribution lists, project organization, and measurement/data acquisition, are included in the RAWP proper; all other required QAPP elements are addressed or referenced in this appendix.

C.1 PROBLEM DEFINITION AND BACKGROUND

The removal action selected for the site is land-use controls/excavation/removal/off-site disposal. Sampling and analysis components of the work will include the collection and analysis of confirmation soil samples. In addition, it may be necessary to collect soil and/or ash samples to classify waste for disposal or to determine the need for further excavation. The primary contaminants of concern (COCs) identified in site soils are lead, cadmium, arsenic, and dioxins/furans. Therefore, the samples will be analyzed for total metals and dioxins/furans. Some of these analyses may be conducted on a soluble threshold limit concentration (STLC), on toxicity characteristic leaching procedure (TCLP) or Deionized Water Waste Extraction Test (DI WET) leachate, or on water samples (e.g., decontamination water). The data will be used to evaluate the completion of the removal action activities and/or to direct field activities. The objectives and background information for implementation of the RAWP, as well as the confirmation sampling strategy, are presented in Section 6.0 of the RAWP.

C.2 PROJECT/TASK DESCRIPTION

The task description and schedule are presented in Section 6.0 of the RAWP.

C.3 DATA QUALITY OBJECTIVES

DQOs are used to develop a scientific and resource-effective data collection design. DQOs should ensure that the data collected meet the qualitative and quantitative goals of the project. The DQOs are established based on U.S. Environmental Protection Agency (EPA) guidance, using the 7-step process described hereafter (EPA, 2002).

1. **State the Problem.** Confirm that the removal action has removed soil, meeting the remediation goals.
2. **Identify the Decision.** Analytical data obtained will be compared to removal action objectives (RAOs) to evaluate the completion of the removal action.
3. **Identify Inputs to the Decision.** Inputs include analytical results, human health criteria, and regulatory guidance.

4. **Define the Study Boundaries.** Excavation confirmation soil samples (floor and wall) will be collected as described in Section 6.0 of the RAWP. Ash deposits remaining in the furnace will be characterized.
5. **Develop a Decision Rule.** If soil confirmation sample analyses meet the RAO concentration requirements, the excavation is completed. If confirmation samples collected exceed the RAO concentration requirements presented in Section 5.0 of this RAWP, then additional soil will be excavated, and additional confirmation samples will be collected. Additional quantities excavated will be based on field decisions. The confirmation samples must meet the RAOs before the excavation task is completed.
6. **Specify Limits on Decision Errors.** The results of all analytical testing will be reviewed as specified in Sections C.10 and C.12. Data are determined to be valid if the specified limits on precision, accuracy, representativeness, comparability, and completeness (PARCC) are achieved (Tables C-1 and C-2).
7. **Optimize the Design for Obtaining Data.** The sampling plan is based on the size of the planned excavation areas. The analytical methods for the analysis of the soil samples are EPA-approved, definitive analytical methods, which satisfy the decision criteria (Step 5) and the decision error limits (Step 6). The design will be used to focus all sampling and analysis activities on the decision (Step 2) in an efficient and cost-effective way.

C.4 SPECIAL TRAINING REQUIREMENTS AND CERTIFICATIONS

Field sampling personnel and subcontractors will be certified to work at hazardous waste sites, as required by federal and California Occupational Safety and Health Administration (OSHA) regulations. Subcontractors will have all applicable federal, state, and local licenses. The analytical laboratory will be a certified State of California Department of Health Services laboratory. Reports submitted to the DTSC will be reviewed and approved by a California-registered geologist or professional engineer registered in California.

C.5 SAMPLE CONTAINERS, VOLUMES, AND PRESERVATION

The sample containers, preservation methods, and holding time requirements will be based on standard protocols and finalized in discussions with the selected analytical laboratory.

C.6 SAMPLE HANDLING, CUSTODY REQUIREMENTS, AND DOCUMENTATION

Field personnel (samplers) are responsible for performing sample custody, documentation, and tracking tasks when collecting environmental samples for laboratory analysis or archiving. The sampler (or person in possession of samples) is responsible for the care and custody of the samples from the time of collection until a documented transfer to the analytical laboratory. Physical custody of the environmental sample is maintained by keeping samples in the possession of the sampler or retaining them in a secure area with restricted access. Custody is maintained during sample shipping by placing samples in coolers with the appropriate custody documentation and securing the containers and coolers with official custody seals, so that samples cannot be accessed without breaking the seal.

TABLE C.1

Reporting Limits and Analytical Data Quality Objectives for Soil Analyses

Analysis	Reference Method	Units	Reporting Limits	Precision Objectives: Field Duplicate Analysis (RPD)	Precision Objectives: MS/MSD Duplicate Analysis (RPD)	Accuracy Objectives: Matrix Spike Analyses (% Recovery)	Accuracy Objectives: Laboratory Control Sample Analyses (% Recovery)	Percent Completeness
Metals	SW6010B	mg/kg	0.5 – 10	≤ 50	≤ 35	75 – 125	75 – 125	≥ 90
Dioxins and Furans	SW8290	ng/g	0.001 – 0.01	≤ 50	≤ 40	25 – 140	25 – 140	≥ 90

Note: Matrix spike/matrix spike duplicate (MS/MSD) criteria apply to laboratory duplicate RPDs for those methods that do not require MS/MSDs. Reporting limits and analytical data quality objectives are based on the Associated Laboratories' contract #98-T1655 with DTSC.

EPA = Environmental Protection Agency
metals = arsenic, cadmium, and lead
mg/kg = milligrams per kilogram (equivalent to parts per million)
RPD = relative percent difference
SW = solid waste
ng/g = nangrams per gram (equivalent to parts per billion)
≤ = less than or equal to
≥ = greater than or equal to
% = percent

TABLE C.2

Reporting Limits and Analytical Data Quality Objectives for Water Analyses

Analysis	Reference Method	Units	Reporting Limits	Precision Objectives		Accuracy Objectives		Percent Completeness
				Field Duplicate Analysis (RPD)	MS/MSD Duplicate Analysis (RPD)	Matrix Spike Analyses (% Recovery)	Laboratory Control Sample Analyses (% Recovery)	
Metals	SW6010B (Hg by EPA 7470A)	µg/L	0.2 – 500	≤ 30	≤ 20	75 – 125	75 – 125	≥ 95
Dioxins and Furans	SW8290	ng/L	0.01 – 0.5	≤ 30	≤ 30	25 – 140	25 – 140	≥ 95

Note: MS/MSD criteria apply to laboratory duplicate RPDs for those methods that do not require MS/MSDs. Reporting limits and analytical data quality objectives are based on the Associated Laboratories' contract #98-T1655 with DTSC.

DTSC = Department of Toxic Substances Control
EPA = Environmental Protection Agency
Metals = arsenic, cadmium, and lead
MS/MSD = matrix spike/matrix spike duplicate
ng/L = nanograms per liter
RPD = relative percent difference[
SW = solid waste
µg/L = micrograms per liter
≤ = less than or equal to
≥ = greater than or equal to
% = percent

C.6.1 Chain-of-Custody Procedures

The chain-of-custody form will document the progression of samples from collection to final disposal. These forms will be maintained for all samples collected and will be completed using indelible black or blue ink. No erasures will be permitted. If an incorrect entry is made, the data will be crossed out with a single strike mark and initialed by the originator.

The following information will be specified on the chain-of-custody form:

- Sample number;
- Sampling date;
- Sampling time;
- Sampling location and depth (incorporated in the numbering format, as discussed);
- Preservative (if appropriate);
- Required analyses; and
- Special instructions to the laboratory (e.g., the designation of samples to be used for laboratory QC, such as matrix spike/matrix spike duplicate [MS/MSD]).

A completed chain-of-custody form identifying each sample and designating the required analyses will accompany all shipments. Cooler contents and chain-of-custody forms will be reviewed by a second sampling team member before shipment or transport to the laboratory.

C.6.2 Labeling, Packaging, and Shipment

Sample-handling procedures ensure that samples arrive at the laboratory properly labeled, intact, at the proper temperature, and free of external contamination. Sample labels will be completed for each sample container using block, printed text and indelible ink. Samples will be wrapped and packed to prevent glass-to-glass contact with other samples. Samples requiring preservation at 4 degrees Celsius (4°C) will be shipped overnight or hand-delivered to the analytical laboratories. When necessary, samples will be packed inside plastic coolers with sealed ice packs sufficient to maintain the proper storage temperature until they reach the laboratory.

The sampler will relinquish possession of the samples by signing, dating, and noting the time in the space provided on the chain-of-custody form. The courier name and air bill number will be entered in the "Received By" section. The original documents will be sealed in a plastic bag and taped to the lid of the cooler. When the samples are received by the laboratory, they will be inspected immediately and placed in a sample-storage refrigerator. If samples are known or suspected to be highly contaminated, laboratory sample control will be notified so that those samples can be stored separately from less contaminated samples, thus minimizing the potential for cross-contamination.

C.6.3 Documentation

Sampling efforts and results will be documented in data packages, field notebooks, and photograph notebooks.

C.6.3.1 Data Packages

Data packages will include narratives describing any special situations or non-conformances and analytical report forms for all samples and associated QC samples. The analytical data packages, COCs, and field sampling forms will be included in the final report and stored with all original project documents (i.e., field notebooks, original analytical data packages, original field sampling forms, etc.) for seven years in an off-site storage facility following the completion of this task. Data can be retrieved within five business days by contacting the URS Project Manager.

C.6.3.2 Field Notebooks

Field personnel are responsible for using and maintaining field notebooks when conducting project-related field work. All data collection activities performed at a site will be documented in field notebooks. The documentation will include data and observations sufficient to enable participants to reconstruct all events occurring during site activities. Field notebooks will have consecutively numbered pages and will be assigned permanently to individual field personnel. The cover of each notebook will contain the following information:

- Person or organization to whom the book is assigned;
- Book number;
- Project number (if different from site number);
- Site name and number; and
- Start date of notebook entries.

At a minimum, notebook entries must include the following information at the beginning of each day:

- Date;
- Start time;
- Weather;
- State, county, and site address;
- All field personnel present and directly involved; and
- Level of personal protection being used on site.

Other field notebook entries will include (but are not limited to) the following:

- A detailed description of the stage and location of removal activities;
- Information on field QC samples (i.e., duplicates, equipment blanks, and trip blanks);
- Observations about the site and samples (odors, appearance, etc.);
- Information about any activities (extraneous to sampling activities) that may affect the integrity of the samples;
- Equipment used on site, including time and date of calibration (equipment calibration also will be recorded in the calibration log book);

- Maps or photographs acquired or taken at the sampling site; and
- Forms used during sampling.

Deviations from the work plan will be approved by DTSC and URS technical personnel and documented in a field notebook. All notebook entries will be made in indelible black or blue ink. No erasures will be permitted. If an incorrect entry is made, the error will be crossed out with a single strike mark and initialed by the originator.

Each week, the Project Manager or his/her designee will review field notebooks that result from field operations for completeness and accuracy. Any discrepancies within these documents will be noted, and the notebook will be returned to the originator for correction. The reviewer will signify that comments were incorporated by signing and dating the reviewed document.

C.6.3.3 Photograph Notebooks

Field personnel are responsible for documenting all project-related photographs. All photographs taken at the site will be documented in the photograph notebook. Photographs will be numbered consecutively, and their numbers will be entered into the photograph notebook with a brief description of the photograph. The description will include the following information:

- Date;
- Time;
- Location;
- Direction (i.e., facing north, looking to the southeast etc.); and
- Description of the photograph.

C.7 ANALYTICAL METHODS

Soil samples collected during this investigation will be submitted to a California-certified laboratory for analysis. Confirmation soil samples will be analyzed for arsenic, cadmium, and lead by EPA Method 6010B. If a sample concentration exceeds 10 times the respective STLC for a metal, a leachate sample should be prepared using the California DI WET and analyzed accordingly. In addition, two furnace ash samples will be analyzed for dioxins/furans by EPA Method SW8290.

Analytical methods were selected to meet the project objectives and cost considerations for this project. All methods except the DI WET extraction (Title 22 WET [State of California]) are EPA-promulgated methods. All samples will be submitted to a California-certified laboratory for analysis. The QC and reporting limit requirements for each method are presented in Tables C-1 and C-2.

C.8 QUALITY CONTROL REQUIREMENTS

C.8.1 Quality Assurance Objectives

The analytical data will be evaluated to achieve an acceptable level of confidence in the decisions derived from the data. The methods and the procedures used to implement and achieve the DQOs are described throughout this QAPP. Data quality indicators (DQI) are qualitative and quantitative descriptors used to interpret the degree of acceptability or usability of data. The five principal DQIs are (1) precision, (2) accuracy, (3) representativeness, (4) comparability, and (5) completeness (PARCC).

Specific QA objectives for each of these five data assessment parameters are summarized in Table C-1 and described hereafter. These parameters are expressed as quantitative and qualitative statements concerning the type of data needed to support a decision, based upon a specified level of uncertainty. The criteria (predetermined acceptance limits) are expressed as numerical values for all laboratory analyses and field tests identified.

C.8.1.1 Precision

Precision is a measure of mutual agreement among replicate (duplicate) or co-located sample measurements of the same parameter under similar conditions. The closer the numerical values of the measurements are to each other, the more precise the measurement. Precision for a single parameter will be expressed as the percentage of the mean of measurements, such as relative percent difference (RPD) or relative standard deviation (RSD). Precision is calculated for laboratory duplicates, field duplicate samples, and MSDs. Precision will be determined for no fewer than one sample in 10 (10%) for field replicates and one in 20 (5%) for laboratory MSDs. In addition, precision will be maintained by conducting routine instrument checks to demonstrate that operating characteristics are within predetermined limits.

C.8.1.2 Accuracy

Accuracy is a measure of bias in a measurement system. The closer the value of the measurement agrees with the true value, the more accurate the measurement. Accuracy includes a combination of random error (precision) and systematic error (bias) components that result from the sampling and analytical operations. Accuracy is expressed as the percentage of recovery of surrogates, laboratory control samples (LCS), and matrix spikes. Samples having known constituent concentrations will be analyzed in the laboratory for comparison. MS/MSD samples will be collected at a frequency of one per 20 samples (5%) of a similar matrix or, at a minimum, of one pair per sample batch.

C.8.1.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent a characteristic of a population, variations at a sampling point, or an environmental condition. The design of and rationale for the sampling program (in terms of the purpose for sampling, selecting the sampling locations, the number of samples to be collected, the ambient conditions, the frequencies and time for sample collection, and the sampling techniques) ensures that the environmental condition has been represented sufficiently.

C.8.1.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Sample data will be collected, reported, and compared with other measurement data for similar samples and sample conditions. This goal will be achieved by using standard operating procedures to collect and analyze representative samples, reporting analytical results in appropriate and consistent units, and meeting similar accuracy and precision acceptance criteria. Each analytical procedure selected from among the acceptable options will be used throughout the project, unless a rationale is provided for alteration.

C.8.1.5 Completeness

Completeness is a comparison of the number of valid data obtained from a measurement effort to the total number needed to meet the project goals. The closer the numbers are, the more complete the measurement process. Completeness will be expressed as the percentage of valid to planned measurements. Valid data are values that are not rejected for any reason, including deviations from QC requirements. An objective of the sampling program is to establish the quantity of data needed to support the investigation. This will be achieved by obtaining the following:

- Samples for all types of analyses required at each individual location;
- A sufficient volume of sample material to complete the analyses;
- Samples that represent all possible contaminant situations under investigation; and
- Samples at critical data locations, such as background and control samples.

Completeness will take into consideration environmental conditions and the potential for change with respect to time and location. The completeness goal for this project is 95%; the goal is 90% for each analytical method per matrix. Tables C-1and C-2 list acceptance criteria for precision, accuracy, and completeness for each of the analytical methods specified. The criteria (predetermined acceptance limits) are expressed as numerical values.

C.8.2 Quality Control Checks

QC checks will be used to assess and document data quality and to identify discrepancies in the measurement process requiring correction. The collection and analysis of equipment decontamination rinseates and field duplicate samples will be used to assess the representativeness of the environmental samples, the thoroughness of the field equipment decontamination procedures, and the precision of sample collection, handling, and analytical procedures. Method blanks, LCSs, and MS/MSD duplicates will be performed in the laboratory to assess the potential for false positive results (from laboratory contamination), the accuracy of laboratory analysis, and the accuracy and precision resulting from laboratory procedures and matrix interferences, respectively. Temperature blanks will ensure that adequate field sampling procedures were used to properly preserve samples during transport to the laboratory.

C.8.2.1 Field Quality Control Check Samples

Equipment Decontamination Blanks

Equipment decontamination blanks will be used to assess the adequacy of procedures that are intended to prevent cross-contamination between sampling locations and samples. Equipment blanks will be collected and analyzed for metals by EPA Method 6010B. The acceptance criteria for all required analytes are less than the reporting limits specified in Table C-2.

Field Duplicates

Field duplicates will be collected at selected locations to evaluate the overall precision and variability associated with the sample collection process, laboratory analysis, and site-specific matrix variability. The field duplicates will be handled and analyzed in the same way as other environmental samples. Samples will be collected and analyzed at a minimum of one per 10 (10%) of the environmental samples collected. Duplicate samples will be homogenized in the field, where practicable, separated into split-sample containers, and shipped blind to the analytical laboratory. The criteria for soil field duplicates is less than or equal to 50 RPD (30 to 50 RPD in water) for results greater than five times the detection limit.

C.8.2.2 Laboratory Quality Control Check Samples

Method Blanks

Method blanks are required for all analyses and are part of the reference method procedures. The required frequency of analysis is once per preparation batch containing 20 samples (5%) or less. The acceptance criteria for all required analytes are less than the reporting limits specified in Tables C-1 and C-2.

Laboratory Control Samples

Laboratory control samples (LCSs) containing all analytes are required for all analytical methods. The required frequency of analysis is once per preparation batch containing 20 samples (5%), or less. The LCS criteria are listed in Tables C-1 and C-2.

Matrix Spike/Matrix Spike Duplicates

MS/MSDs will be specified for selected samples at a frequency of 1 per 20 samples (5%) analyzed. A known concentration of the spike solution containing all analytes will be added to each sample in the fixed laboratory and analyzed in the same way as the environmental samples. The MS/MSD results will be used to assess the accuracy and precision of the data set resulting from the project-specific sample matrix. The MS/MSD criteria are listed in Tables C-1 and C-2.

C.9 DATA MANAGEMENT

The following sections describe the process of handling field sampling data in terms of data generation, review, and routing. Laboratory data-handling procedures are outlined in the laboratory's QA program plan. Analytical data are available in hard copy for a period of two years. Data older than two years are placed on compact disks and stored indefinitely. Data can be requested from the laboratory at any time. The procedures identified in previous sections contain descriptions of the recording of measurements onto data collection forms. This section discusses the monitoring and controls established to track field data through field form completion, field review and correction, and storage and retrieval.

C.9.1 Field Form Completion

Data collection procedures and instructions included in this RAWP provide the guidance necessary to complete the field forms and analytical sampling paperwork involved with data collection activities. Upon completion, field data and analytical sampling paperwork are reviewed for accuracy, completeness, and legibility. Technical personnel will document and review their own work and are accountable for its correctness. The intent of the review is to ensure that all forms are complete and legible and possess the required data elements. The Project Manager or designated reviewer will ensure that the following have been done.

- All forms are completed using a ballpoint pen; all sample labels are completed with an indelible marker.
- If an error is made on any form, the error is struck with a single line, the correct value is written as close to the old value as possible, and the correction is initialed and dated. The incorrect value is not written over or obliterated in any way.
- If any sample shipment or paperwork errors occur, they are documented in the field notebook.

In addition, the Project Manager or designated reviewer will ensure that:

- The correct sample numbers are used;
- The correct number and types of sample bottles are used;
- Preservation is specified (where necessary);
- All corrections are dated and initialed; and
- Chain-of-custody forms are relinquished by the sampler with the correct date and time noted.

C.9.2 Error Detection and Correction

The Project Manager or designee will review all field forms. If any document completion errors are found during the review of project documents, the incorrect form will be sent to the individual best suited to correct the error. Errors on field forms are struck with a single line, the correct value is inserted, and the correction is initialed and dated. The incorrect value will not be written over or obliterated in any way. Once the form has been corrected, it will become the final version of the document, suitable for report usage. The laboratory will provide its procedures for error detection and correction. All laboratory failures and subsequent actions will be reported in the final laboratory data package.

C.10 DATA VALIDATION AND USABILITY

EPA Region 9 Tier 1A validation (data review) will be performed for all of the data generated. This will include the review of analytical result and QC data forms submitted by the analytical laboratory. All data generated will be assessed for PARCC. The data assessment criteria for each of these parameters are established in Section C.8.0.

Laboratory failures will be documented on the Case Narrative of the final laboratory data package and summarized in the final report. The laboratory will provide laboratory corrective action procedures in a QAPP. Potential laboratory failures include equipment malfunction, failure of internal QA/QC checks, failure of performance or system audits, and non-compliance with QA requirements.

All data generated will be assessed for PARCC. The data assessment criteria for these parameters are summarized in Table C-1 and C-2. The methods used to calculate precision and accuracy are described hereafter.

C.10.1 Precision

Precision examines the spread of data about their mean. The spread presents how different the individual reported values are from the average reported values. Precision is a measure of the magnitude of errors and will be expressed as the RPD in the case of two replicates or the RSD in the case of three or more replicates. The lower the values, the more precise the data. These quantities are defined as follows:

$$RPD\ (\%) = \frac{|(D1 - D2)|}{[(D1 + D2)/2]} \times 100\%$$

$$RSD\ (\%) = (SD/M) \times 100\%$$

where:
- D1 = First sample value
- D2 = Second sample value (duplicate)
- SD = Standard deviation
- M = Mean

C.10.2 Accuracy

Accuracy measures the average or systematic error of an analytical method. This measure is defined as the difference between the average of reported values and the actual value.

Accuracy will be expressed as the percent recovery. This quantity is defined as follows:

$$Recovery\ (\%) = \frac{SSR - SR}{SA} \times 100$$

Where:
- SSR = Spike sample result
- SR = Sample result
- SA = Amount of spike added

C.11 RECONCILIATION WITH DQOs

The objective of the project is to collect data from excavations after the removal of contaminated soil. The data produced using procedures defined in this QAPP will be used to evaluate the need for additional excavation. Data will be compared to the RAOs established in Section 4.0 of the RAWP.

C.12 ASSESSMENT AND OVERSIGHT

A senior internal technical reviewer will review all documents to ensure that correct conclusions were made regarding the investigation. When a difference of opinion or an error is identified, it is documented, discussed with the author, and revised. If the issue cannot be resolved, the Project Manager, in consultation with DTSC, makes the determination regarding the content of the report.

C.13 REFERENCES

Environmental Protection Agency, 1986. SW846: *Test Methods for Evaluating Solid Waste – Laboratory Manual Physical/Chemical Methods.* November.

Environmental Protection Agency, 2002. *Guidance for Quality Assurance Project Plans.* U.S. EPA QA/G-5. December.

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APPENDIX D

Transportation Plan for Off-Site Disposal

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EXHIBITS

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ABBREVIATIONS AND ACRONYMS

CG	cleanup goals
COC	chemicals of concern
CY	cubic yards
DTSC	Department of Toxic Substances Control
HASP	Health and Safety Plan
QAPP	quality assurance project plan
RAWP	removal action work plan
RCRA	Resource Conservation and Recovery Act
RI	removal investigation
STLC	soluble threshold limit concentration
TTLC	total threshold limit concentration

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APPENDIX D
TRANSPORTATION PLAN FOR OFF-SITE DISPOSAL

D.1 INTRODUCTION

During recent remedial investigations (RIs), elevated levels of various contaminants of concern (COCs) were detected at the Osage Industries site (site), which is located one mile north of West Rosamond Boulevard, on 60th Avenue West, in Rosamond, California. Concentrations of lead, arsenic, and cadmium elevated above their respective cleanup goals (CGs) were delineated in surface soils in several areas of the site. The Department of Toxic Substances Control (DTSC) plans to conduct a removal action at the site.

A Removal Action Work Plan (RAWP) has been prepared to address the excavation and off-site disposal of lead, arsenic, and cadmium contamination at the site. The CGs for these COCs are presented in the RAWP. This Transportation Plan for off-site disposal is a key component of the RAWP. All removal, transportation, and disposal activities will be performed in accordance with all applicable federal, state, and local laws, regulations, and ordinances.

D.2 WASTE CHARACTERIZATION AND QUANTITY

The COCs are lead, arsenic, cadmium, and dioxins and furans. The volume of contaminated soils is estimated to be 92 cubic yards (cy).

D.2.1 Waste Profile

The waste material will be profiled for acceptance by the disposal facility, and approval from the disposal facility will be obtained before any excavation activities commence. Additional documentation will be provided to DTSC pertaining to waste disposal profiles and waste disposal acceptance before any waste is shipped off site.

D.2.2 Hazardous Waste Management

Any excavated soil containing COCs at concentrations exceeding the California total threshold limit concentration (TTLC) or soluble threshold limit concentration (STLC) is considered a non-Resource Conservation and Recovery Act (RCRA) hazardous waste; in California, this waste must be disposed of in a Class I hazardous waste landfill. Out-of-state, it must be disposed of in a facility that has specific permits to accept these wastes. While remaining in California, all hazardous wastes will be properly managed, manifested, and transported to a California hazardous waste management facility by a registered hazardous waste hauler.

Based on analytical results, some of the soil excavated from the site will be handled, transported, and disposed of as non-RCRA hazardous waste, unless DTSC directs or approves different handling. Some will be handled, transported, and disposed of as non-hazardous.

D.3 SOIL STAGING OPERATIONS

As soil is excavated, it will be loaded directly onto vehicles or temporarily stored in soil staging areas on site until off-site transportation and disposal are available. Staging times will be kept to a minimum.

D.4 REQUIREMENTS OF TRANSPORTERS

DTSC will hire qualified contractors to excavate and haul the excavated soil off site. The selected transporter will be fully licensed and insured to transport the excavated soils. For transportation of hazardous wastes, the selected transporter will be a registered hazardous waste hauler.

D.5 TRAFFIC CONTROL PROCEDURES

Soil for off-site disposal will be transported in end-dump trailers or trucks or in covered roll-off bins to the designated disposal facility. Prior to loading, all dump trucks will be staged along one of the on-site streets to avoid impacts on the local streets. Dump trucks to be loaded will only access the excavation and soil staging area via one of the on-site streets; they will not be allowed to cross soil removal or staging areas. Traffic will be coordinated so that, at any given time, no more than six dump trucks will be on the site; this will reduce truck traffic on surrounding surface streets and dust generation during transportation. While on the unpaved access roads to the site, all vehicles will be required to maintain slow speeds (i.e., less than 10 miles per hour) for safety and for dust control.

D.6 TRUCK-LOADING OPERATIONS

Trucks will be loaded near the excavation area or on the designated portion of the soil-staging area. A front-end loader will load the contaminated soil from the stockpile into dump trucks, or roll-off bins will be loaded onto trucks, for transportation to the designated disposal facility. The excavation will be executed so that the transport trucks will not have to drive on soil containing COCs above CGs, thereby avoiding the creation of potentially hazardous dust in the air or dirt in the truck tires. All vehicles will be decontaminated, as necessary, before they leave the work area. All stray waste material on the vehicles, the tires, or the lip of the roll-off bin, etc., will be cleaned off manually. Then the dump truck or roll-off bin portion of the truck will be covered with a tarp to prevent soil and/or dust from spilling out of the truck during transport to the disposal facility. The removal action contractor's site manager will inspect each truck before it leaves the load-out area to ensure that the payloads are adequately covered, the trucks are cleaned of overburdened soil, and the shipment is properly manifested. Each truck will receive the proper placarding and paper work. Water spray or mist, as appropriate, will be applied during soil-loading operations.

D.7 SHIPMENT DOCUMENTATION

D.7.1 Hazardous Waste Shipment

The Uniform Hazardous Waste Manifest form will be used to track the movement of any excavated soil that is profiled as a hazardous waste; the form will track the soil from the point of generation to the point of ultimate disposition. A copy of the manifest, with instructions, is included as Exhibit D.1. Before transporting the excavated soil off site, an authorized representative of DTSC, or DTSC's designated representative, will sign each hazardous waste manifest. The hazardous waste hauler will then sign the manifest and distribute one signed copy to the removal action contractor's site manager. The removal action contractor's site manager will maintain a copy of the hazardous waste manifest on site for each truckload until completion of the removal action.

D.7.2 Non-Hazardous Waste Shipment

For any excavated soil that is profiled as non-hazardous waste, a proper shipping document (such as a bill of lading or an invoice) of the hauler will be used to document and accompany each truck shipment. At a minimum, the shipping document will include the following information:

- Name and address of waste generator;
- Name and address of waste transporter;
- Name and address of disposal facility;
- Description of the waste; and
- Quantity of waste shipped.

The removal action contractor's site manager will maintain a copy of the shipping document on site for each truckload, until completion of the removal action.

D.8 TRANSPORTATION ROUTES

- To the extent possible, transportation of contaminated soils will be on arterial streets and/or freeways approved for truck traffic, to minimize any potential impact on local neighborhoods. In general, the transport trucks will travel as follows:
  - Exit the site going south on Firmament to Highway 138;
  - Turn west onto Highway 138 for approximately 32 miles to Interstate 5;
  - Travel north for 274 miles to Highway 4 at Stockton;
  - Go east on Highway 4 for 3 miles;
  - Merge onto Highway 99 north for approximately 11 miles; and
  - Arrive at Kettleman.

This is the most direct route to the designated facility. A transportation route map for off-site shipment of contaminated soil is included as Exhibit D.2; it will be updated as necessary.

Approximately 10 truckloads will be used to transport and dispose of 90 cy of waste materials off site. Since the excavation is estimated to require less than two weeks, this volume of trucks is not expected to cause a disruption in local traffic. In addition, transportation will be timed to avoid rush-hour traffic.

D.9 OFF-SITE LAND DISPOSAL FACILITIES

Based on the results of waste profiling and classification, the excavated soil will be transported to a proper off-site land disposal facility.

D.9.1 RCRA Hazardous Waste

All RCRA hazardous waste will be disposed of at the Class I land-disposal facility specified hereafter, or an equivalent:

Chemical Waste Management
35251 Old Skyline Road
Kettleman, California 93239
Telephone: (559) 338-9811

D.9.2 Non-RCRA Hazardous Waste

Non-RCRA hazardous waste is a California-only hazardous waste. It may be disposed of at the Class I land-disposal facility specified hereafter, or an equivalent, or at an out-of-state Class III landfill:

Chemical Waste Management
35251 Old Skyline Road
Kettleman, California 93239
Telephone: (559) 338-9811

D.9.3 Non-Hazardous Waste

Non-hazardous soils will be transported to the Class II landfill specified hereafter, or an equivalent:

Allied Waste Forward Landfill
Austin Road
Manteca, CA
Telephone: (209) 466-4482

Final selection of the landfill for disposal will be based on approval from the landfill. Once the landfill is determined, copies of waste profile reports used to secure disposal permission from the landfill will be provided to DTSC. Compliance with the land-disposal restrictions and land-ban requirements for hazardous wastes (RCRA or non-RCRA), as necessary, will be documented and provided to DTSC once the disposal facility is selected.

D.10 RECORDKEEPING

As presented in the Quality Assurance Project Plan (QAPP) provided in Appendix C, the removal action contractor will be responsible for maintaining a field logbook during the removal action activities. The field logbook will be used to document observations, personnel on site, truck arrival and departure times, and other vital project information.

D.11 HEALTH AND SAFETY

The site-specific Health and Safety Plan (HASP) Addendum for this removal action has been prepared and is provided in Appendix B. Everyone working at the site will be required to be familiar with, and comply with, the HASP.

D.12 CONTINGENCY PLAN

Each waste hauler is required to have a contingency plan prepared for emergency situations (vehicle breakdown, accident, waste spill, waste leak, fire, explosion, etc.) during the transportation of excavated soils from the site to the selected disposal facility. Once the waste hauler is selected, a copy of its contingency plan will be attached to this Transportation Plan.

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EXHIBIT D.1

HAZARDOUS WASTE MANIFEST BLANK FORM

State of California--Environmental Protection Agency
Form Approved OMB No. 2050-0039 (Expires 9-30-94)
Please print or type. *Form designed for use on elite (12-pitch) typewriter.*

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.
Manifest Document No.
2. Page 1 of
Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
A. State Manifest Document Number 00000000
4. Generator's Phone ( )
B. State Generator's ID
5. Transporter 1 Company Name
6. US EPA ID Number
C. State Transporter's ID
D. Transporter's Phone
7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone
9. Designated Facility Name and Site Address
10. US EPA ID Number
G. State Facility's ID
H. Facility's Phone

GENERATOR

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a.					State / EPA/Other
b.					State / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

EXAMPLE

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

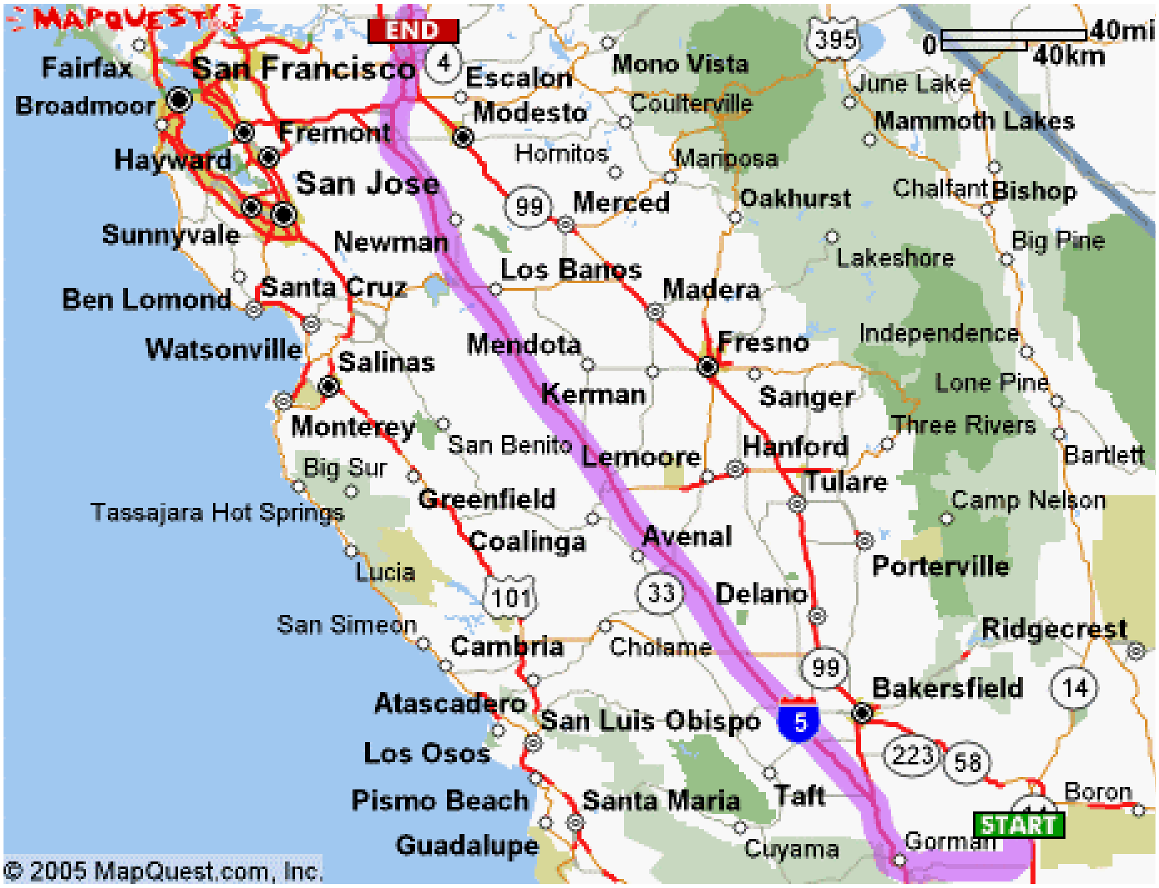
Printed/Typed Name	Signature	Month Day Year

DO NOT WRITE BELOW THIS LINE.

Write: TSDF SENDS THIS COPY TO DTSC WITHIN 30 DAYS.
To: P.O. Box 3000, Sacramento, CA 95812

EXHIBIT D.2

MAP TO KETTLEMAN LANDFILL



Map to Kettleman Landfill

APPENDIX E

Air Monitoring Plan

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ATTACHMENTS

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ABBREVIATIONS AND ACRONYMS

AL	action level
AIHA	American Industrial Hygiene Association
CAAQS	California Ambient Air Quality Standard
COC	contaminants of concern
EPA	United States Environmental Protection Agency
HEPA	high efficiency particulate arrestor
IH	industrial hygiene
kg	kilogram
MET	meteorological
mg	milligrams
m^3	cubic meters
NAAQS	National Ambient Air Quality Standard
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
ppm	parts per million
QA	quality assurance
QC	quality control
RAWP	removal action work plan
RI	remedial investigation
TL	trigger level
TSP	total suspended particulate
TWA	time-weighted average
WBZ	worker breathing zone
µg	microgram

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APPENDIX E
AIR MONITORING PLAN

E.1 INTRODUCTION

This Air Monitoring Plan was prepared to provide a plan for monitoring air quality during activities at the Osage Industries site in Bakersfield, California (site). The purpose of the air-monitoring program is to measure air quality impacts at the project site to gauge the need for improved dust control as construction progresses and to provide documentation of air quality monitoring. The plan includes a discussion of contaminants of concern (COCs), air monitoring sampler locations, monitoring schedule, analytical methods, quality assurance/quality control (QA/QC) procedures, and the methodology for data analysis and reporting.

E.1.1 BACKGROUND

The site background is provided in Sections 2.0 and 3.0 of the Removal Action Work Plan (RAWP) (URS Corporation Americas [URS], 2005). Given the potential effect on local air quality attributable to the activities involved in the remediation of contaminated soil, routine air monitoring will be performed during the removal action to assess potential worker exposure to contaminant-laden particulate matter. Air monitoring will be performed downwind from soil-removal activities to ensure that adequate controls are in place during excavation and other earth-moving activities.

E.1.2 CONTAMINANTS OF CONCERN

Based on analytical data collected during the remedial investigation (RI), the COCs for ambient air are lead, beryllium, cadmium, and arsenic. The corroded drums present the greatest hazard because they have the site's greatest contaminant concentrations of lead (66,100 milligrams per kilogram [mg/kg]), arsenic (1,400 mg/kg), and cadmium (707 mg/kg). Most of the remainder of the site has lower concentrations of contamination in site materials (e.g., in the furnace, transformer, ash piles, soil, etc). Notable high concentrations include the following:

- Dioxins/furans in furnace ash (1.7 micrograms per kilogram [µg/kg]);
- Cadmium (166 mg/kg) in sample OS 1-0.5;
- Arsenic (253 mg/kg) and lead (9,520 mg/kg) in the transformer; and
- Beryllium (48.8 mg/kg) in sample SOP1-0.5.

However, given the different levels of contamination in the corroded drums, compared to all other sources of contamination at the site, two distinct groups are identified. Each group will have distinct trigger levels (TLs) for its associated activities. Group A encompasses any and all activities dealing with site materials and soils, excluding the handling or disturbance of the corroded drums. Group B encompasses any and all activities dealing with site materials and soils, including the handling or disturbance of the corroded drums.

Airborne concentrations of these non-volatile contaminants and materials may exceed the Occupational Safety and Health Administration (OSHA) or Cal/OSHA permissible exposure limit (PEL) or action level

(AL). Based on the calculations presented in the attachments to this plan, lead is the most significant hazard during activities involving corroded drums or the disturbance of other site materials and soils. Thus, minimizing lead exposure will be used as the criteria when determining the appropriate TL. Group A activities have an airborne particulate occupational exposure TL beginning at a concentration of 1.58 mg of particulates per cubic meter (m^3) of air. Group B activities have an airborne particulate occupational exposure TL beginning at a concentration of 0.23 mg/m^3. An exceedence of these TLs could result in a short-term exceedence of the 8-hour time-weighted average (TWA) of the Cal/OSHA or OSHA PELs or the AL for lead of 0.03 mg/m^3, assuming a maximum lead concentration of 9,520 mg/kg detected in the transformer sample during Group A activities, and 66,100 mg/kg detected in the corroded drum sample during Group B activities.

There is also the potential for dust contaminated with dioxins/furans to be released to the atmosphere during the disposal of the furnace. However, the ambient total dust exposure criteria of 15 mg/m^3 is far more restrictive for occupational exposure, and it eliminates concerns with airborne exposure to hazardous concentrations of dioxins/furans.

With the exception of one temporary on-site residence, no residences are within 2,000 feet of the site boundary. Ambient air samples will be collected for total lead particulate and dust. The air samples will be collected at the property fenceline; exposure samples will be collected from the worker breathing zone (WBZ) for one employee considered to be at the highest risk for dust exposure. In addition, all employees involved in the corroded drum activities will be sampled for total lead. The sampling will serve to document that dust control measures are appropriate for the hazardous constituents anticipated at the site, and that emissions of COCs from the site or exposures to workers are minimized and kept within federal and California regulatory criteria.

E.2 MONITORING PROGRAM

This subsection presents the methodology for conducting air monitoring and collecting air samples.

URS will conduct air monitoring activities as a QA check to ensure site conditions are adequately assessed and maintained. A certified laboratory will perform all laboratory analyses of air particulate samples. All sampling and analysis will be conducted in accordance with procedures approved by the state and federal governments. A summary of the monitoring results will be incorporated into the removal action report and will include a description of the detailed field procedures, analytical procedures, and site-specific meteorological conditions present during monitoring and an interpretation and summary of the sampling results.

The air monitoring program includes the collection of meteorological data and conducting point source monitoring for total dust using a real-time aerosol monitor, such as an MIE Data-Ram DR-2000 (or equivalent).

E.2.1 AIR MONITORING AND AIR SAMPLING

URS will perform real-time direct reading air monitoring to determine the concentrations of particulate and metals in the airborne particulate. Real-time measurements will be documented throughout the field activities. The results will dictate dust-suppression activities and provide guidance to site workers regarding respiratory protection requirements. URS will perform this task to confirm site conditions are maintained as required for overall site QA for the project. Real-time monitoring results will be used to implement modifications to remedial activities if specified TLs are exceeded.

Air samples will be collected downwind from work areas near selected work zone boundaries. The wind direction will be determined using a windsock. Wind direction data will be recorded on the attached monitoring sheets, along with dust measurement readings, time, date, and location of the measurement with respect to site features.

E.2.2 TRIGGER LEVELS

The real time particulate monitoring instrument will be used to assess worker exposure to COCs in total suspended particulate (TSP) from removal action activities. Worker exposure monitoring includes evaluating the need for, or adequacy of, respiratory protection; determining the appropriate level of PPE; documenting potential exposures; and evaluating potential health hazards. Response criteria for airborne particulates/dust are presented in Table E.1 and are calculated values based on the assumption of a conservative/worst-case exposure scenario. The exposure scenario is based on the maximum detected on-site concentration of lead (as of November 2005), described in section E.1.2.

TABLE E.1

Air Monitoring Action Levels for Airborne Dust Particulates

TL Criteria Concentration [a] Group A (Site wide Activities) (Monitoring location)	TL Criteria Concentration [a] Group B (Corroded Drum Activities) (Monitoring location)	Action
$\leq$1.58 mg/m^3 [b] (Intermittent) (WBZ)	$\leq$ 0.23 mg/m^3 [b] (Intermittent) (WBZ)	Monitor on- and off-site airborne particulate concentrations; initiate dust suppression measures to ensure the WBZ concentrations are below action levels; implement engineering controls.
> 1.58 mg/m^3 [c] (WBZ)	> 0.23 mg/m^3 [c] (WBZ)	Require Level C half-face respiratory protection with HEPA cartridges. Continue on- and off-site monitoring and dust suppression measures; conduct personal monitoring to determine potential personnel exposure levels.
> 7.88 mg/m^3 [c] (WBZ)	> 1.13 mg/m^3 [c] (WBZ)	At 5 times the TL, require Level C full-face respiratory protection with HEPA cartridges. Continue on- and off-site monitoring and dust suppression measures; conduct personal monitoring to determine potential personnel exposure levels.
> 39.4 mg/m^3 [c] (WBZ)	> 5.67 mg/m^3 [c] (WBZ)	At 25 times the TL, require Stop Work or upgrade to supplied air respiratory protection.

TABLE E.1

Air Monitoring Action Levels for Airborne Dust Particulates

TL Criteria Concentration [a] Group A (Site wide Activities) (Monitoring location)	TL Criteria Concentration [a] Group B (Corroded Drum Activities) (Monitoring location)	Action
$\leq$0.378 mg/m^3 [d] (Intermittent) (Ambient Air-Site Fenceline)	$\leq$0.054 mg/m^3 [d] (Intermittent) (Ambient Air- Site Fenceline)	Monitor fenceline airborne particulate concentrations; initiate dust suppression measures and engineering controls. Stop work if fenceline concentrations exceed the criteria concentration for dust above background concentration.
$\geq$0.378 mg/m^3 [d] (Intermittent) (Ambient Air-Site Fenceline)	$\geq$0.054 mg/m^3 [d] (Intermittent) (Ambient Air-Site Fenceline)	Monitor fenceline airborne particulate concentrations; increase dust suppression measures, and improve engineering controls. Recommend Stop Work until concentrations subside to less than TL Criteria Concentration above background.
$\geq$0.378 mg/m^3 [d] (Continuous) (Ambient Air-Site Fenceline)	$\geq$0.054 mg/m^3 [d] (Continuous) (Ambient Air-Site Fenceline)	Monitor fenceline airborne particulate concentrations; increase dust suppression measures and improve engineering controls. Stop work until fenceline concentrations subside to less than TL Criteria Concentration above background.

[a] Readings above background concentrations: Intermittent = less than one minute; continuous = more than one minute.

[b] WBZ concentrations of dust have a TL Criteria Concentration based on minimizing worker exposure and not to exceed one-half the calculated AL. The AL is based on a maximum concentration of 9,520 ppm lead for sitewide activities, excluding working with the corroded drums, and 66,100 ppm lead for activities working with the corroded drums.

[c] Based on calculated action levels for dust containing lead at the concentration described above.

[d] Above background (upwind) concentrations. The calculated airborne dust TL concentrations are based on the California and the National Ambient Air Quality Standard (0.0015 mg/m^3 for lead) and the maximum concentration of lead at the site for sitewide activities of 9,520 ppm and for activities with the corroded drums of 66,100 ppm lead.

AL	=	action level	PPM	=	parts per million
HEPA	=	high efficiency particulate arrestor	TL	=	trigger level
mg/m^3	=	milligrams per cubic meter	WBZ	=	worker breathing zone

TLs are based on the combination of the maximum contaminant concentration (in this case, of lead), the measured airborne concentration, and the exposure criteria of the COC. The TL is a predetermined concentration of total airborne particulate generated during particulate-disturbing work activities, based on anticipated maximum concentrations identified in previous analyses. The TL is intended to aid field supervisors and health and safety staff in determining when additional measures are required to protect worker and public health.

The TLs are derived (calculated) from the highest known concentrations of the COCs anticipated to be disturbed during the scheduled activity. The contaminants may be in the soil, in a piece of equipment (e.g. a transformer), or in some material (e.g., corroded drums) known to exist at the site. For this site, lead was found to be the most restrictive contaminant. The logic for implementing a specific TL is presented in the attachments. Two types of TLs, an occupational TL and an ambient TL, have been identified. The occupational TL is further delineated into two activity groups (Group A and B), dependent on the degree and identification of the known contamination. Group A activities deal with any contamination known to be present at the site, except for the contamination associated with the corroded drums. Group B activities are specifically associated with any handling or disturbance of the corroded drums, or any activity conducted within 50 feet of these drum-based activities. The TL dictates respiratory requirements for site workers. The ambient TL dictates administrative and engineering controls to improve dust-suppression activities, thereby minimizing the off-site migration of potentially contaminated dust.

The occupational TLs for dust are derived by calculating the total airborne dust concentration required to exceed one-half the exposure criteria. For this project, the exposure criterion is the OSHA AL or one-half the OSHA PEL for the most hazardous constituent. Lead was determined to be the most restrictive occupational hazard, based on the maximum concentration of 9,250 mg/kg for Group A activities and 66,100 mg/kg for Group B activities and on the OSHA AL of 0.03 mg/m^3. For total airborne dust, the occupational TLs presented in Tables E.2a and E.2b are considered concentrations above background dust concentrations that exist when no site activities are taking place. Calculating the total airborne dust concentration required for a contaminant to exceed the California Ambient Air Quality Standard (CAAQS) for a 24-hour period derives the ambient TL for dust. For this project, lead was determined to be the most restrictive ambient hazard for the general public, based on the maximum concentration of 9,250 mg/kg for Group A activities and 66,100 mg/kg for Group B activities and the CAAQS of 1.5 µg of lead per m^3 of air. The CAAQS is based on a 24-hour emission rate; however, site activities are anticipated to occur for 10 hours (or less) per 24-hour period. No activity-based emissions are anticipated during the 14-hour non-work period. Because of this, the emissions for the 24-hour period are anticipated to occur within a 10-hour time frame, and the TL is calculated based on this 10-hour activity period. For total airborne dust, the ambient TL (above background) presented in Tables E.3a and E.3b are based on a 10-hour work period.

The Occupational Trigger Levels and Exposure Limits are presented in Tables E.2a and E.2b. These TLs may be modified in the field as sitewide maximum contaminant levels decrease. The corroded drum TL will remain fixed until the completion of the drum remediation activity. Revised TLs will be recalculated using the logic presented in this appendix and in the attachments.

The ambient air quality TLs and air quality standards are presented in Tables E.3a and E.3b. These TLs may be modified in the field as sitewide maximum contaminant levels decrease. Revised TLs will be recalculated using the logic presented in this appendix and in the attachments.

E.2.3 AIR MONITORING SCHEDULE

Air monitoring will be conducted four times daily during remediation activities using the MIE Data-RAM (or equivalent). Site activities typically will last approximately 8 to 10 hours per day. Air will be monitored on the following approximate schedule:

TABLE E.2a

Occupational Trigger Levels and Exposure Limits for COCs (Group A, Sitewide Activities)

COC	Greatest Concentration in Soil (mg/kg) ppm[a]	Trigger level (mg/m^3) (calculated)[b]	Action Level (mg/mg^3)[c]	OSHA PEL/STEL (mg/m^3)[c]	CAL-OSHA PEL (mg/m^3)[d]	CAL-OSHA STEL (mg/m^3)[d]
Arsenic dust (as As)	253.0	9.88	0.005	0.01	0.01	NE
Beryllium dust (as Be)	48.8	10.25	NA	0.002	0.002	0.005
Cadmium dust (as Cd)	166.0	7.53	0.0025	0.005	0.005	NE
Lead Dust (as Pb)	9520.0	1.58	0.030	0.05	0.005	NE

a See URS, 2005, Table 4-2.
b See attached sample calculation for lead TLs.
c Source: NIOSH Pocket Guide to Chemical Hazards, 2005 (Available at http:www.CDC.GOV/NIOSH/NPG/).
d Source: California Code of Regulations (CCR) Title 8, TABLE AC-1 "Permissible Exposure Limits for Chemical Contaminants"

CAL-OSHA	=	California OSHA
COC	=	contaminant of concern
mg/kg	=	milligrams per kilogram
mg/m^3	=	milligrams per cubic meter
NE	=	Not established
NIOSH	=	National Institute of Occupational Safety and Health
OSHA	=	Occupational Safety and Health Administration
PEL	=	permissible exposure limit
ppm	=	parts per million
STEL	=	short-term exposure limit

TABLE E.2b

Occupational Trigger Levels and Exposure Limits for COCs (Group B - Corroded Drum Activities)

COC	Greatest Concentration in Soil (mg/kg) ppm[a]	TL (mg/m^3) (calculated)[b]	Action Level (mg/mg^3)[c]	OSHA PEL/STEL (mg/m^3)[c]	CAL-OSHA PEL (mg/m^3)[d]	CAL-OSHA STEL (mg/m^3)[d]
Arsenic dust (as As)	1400.0	1.79	0.005	0.01	0.01	NE
Beryllium dust (as Be)	NA	NA	NA	0.002	0.002	0.005
Cadmium dust (as Cd)	707.0	1.77	0.0025	0.005	0.005	NE
Lead Dust (as Pb)	66100.0	0.23	0.030	0.05	0.005	NE

a See URS, 2005, Table 4-2.
b See attached example calculation for lead TLs.
c Source: NIOSH Pocket Guide to Chemical Hazards, 2005 (Available at http:www.CDC.GOV/NIOSH/NPG/).
d Source: California Code of Regulations (CCR) Title 8, TABLE AC-1 "Permissible Exposure Limits for Chemical Contaminants"

CAL-OSHA = California OSHA
COC = contaminant of concern
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
NA = not applicable
NE = not established
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
PEL = permissible exposure limit
ppm = parts per million
STEL = short-term exposure limit
TL = trigger level

TABLE E.3a

Ambient Site Perimeter Trigger Levels and Exposure Limits for COC (Sitewide Activities)

COC	Greatest Concentration in Soil (mg/kg) ppm [a]	24-Hour TL (mg/m^3) (calculated)[b]	10-Hour TL (mg/m^3) (calculated) [b]	NAAQS	CAAQS
Lead dust (as Pb)	9,520	0.158	0.378	0.0015	0.0015

a See URS, 2005, Table 4-2
b See attached example calculation for lead TLs.

CAAQS = California Ambient Air Quality Standard
COC = contaminant of concern
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
NAAQS = National Ambient Air Quality Standard
ppm = parts per million
TL = trigger level

TABLE E.3b

Ambient Site Perimeter Trigger Levels and Exposure Limits for COC (Corroded Drum Activities)

COC	Greatest Concentration in Soil (mg/kg) ppm[a]	24-Hour TL (mg/m^3) (calculated)[b]	10-Hour TL (mg/m^3) (calculated)[b]	NAAQS	CAAQS
Lead dust (as Pb)	66,100	0.023	0.054	0.0015	0.0015

a See URS, 2005, Table 4-2.
b See attached example calculation for lead TLs.

CAAQS = California Ambient Air Quality Standard
COC = contaminants of concern
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
NAAQS = National Ambient Air Quality Standard
ppm = parts per million
TL = trigger level

- One hour after work starts;
- Two hours before lunch;
- One hour after lunch;
- Two hours before stop work for the day.

Monitoring results will be communicated daily to the construction team and more frequently as conditions warrant. The construction team will institute controls to reduce dust emissions if downwind perimeter monitoring results exceed the higher value of the following parameters:

- The appropriate occupational TL (presented in Tables E.1, E.2a, and E.2b) in the WBZ requires an upgrade in respiratory protection to protect site personnel from occupational exposure to lead;
- The appropriate site perimeter TL (presented in Tables E.1, E.3a, and E.3b) detected at the fenceline (based on the CAAQS and National Ambient Air Quality Standard [NAAQS] for lead).

Attachment E.1 presents the logic and TLs with respect to the OSHA PELs for arsenic, beryllium, cadmium, and lead and the CAAQS and NAAQS for lead for Group A activities. Attachment E.2 presents the monitoring action TLs with respect to the OSHA PELs for arsenic, cadmium, and lead and the CAAQS and NAAQS for lead for Group B activities.

E.2.4 MONITORING LOCATIONS

Based on a review of local meteorological conditions for the site, predominant winds are from the northwest. Therefore, it is expected that air monitoring will be conducted southeast of the remediation areas identified in the RAWP. A windsock (or similar) will be used to determine the actual wind direction in the field. Actual field conditions will justify the repositioning of sampling and monitoring locations.

Some minor adjustments will be made in the field as necessary to keep air-monitoring personnel clear of the grading and excavation equipment used for remediation.

E.2.4.1 Air Sampling Program

Industrial hygiene (IH) sampling techniques will provide accurate and defendable results data for airborne concentrations of dust and lead. The sampling will collect 8-hour ambient air and occupational exposure samples.

The IH technique provides adequate lead detection capabilities to meet regulatory requirements. IH techniques use a small, battery-operated pump to maintain a predetermined, calibrated air flow rate (flow-compensated). The flow rate is maintained even though the loading of particulate material on the filter will typically increase over time.

E.2.4.2 Sampling and Analytical Methods

Personal, area, and perimeter samples will be collected using National Institute of Occupational Safety and Health (NIOSH) sampling and analytical Method 7300 (see Table E.4). Air sample flow rates will be calibrated before and after each use with a primary calibration standard, such as a dry cell calibrator or similar device. The sample volume for each sample will be calculated from the calculated flow rate and sample duration. Sampling periods will be approximately 8 hours long but may be extended to periods of 24 hours, if needed. The samples will be collected on cellulose ester membrane filter cassettes attached to sampling pumps with a nominal flow rate of 3 to 4 liters per minute. The sample inlet will be positioned at the approximate height of the breathing zone of an adult (typically, 4 to 5.5 feet above the ground). A laboratory accredited by the American Industrial Hygiene Association (AIHA) will analyze all samples.

E.2.4.3 Sampling Locations, Site Access and Security

The project manager, health and safety officer, or task manager will be responsible for coordinating site access and security and for ensuring appropriate equipment maintenance. One IH sampling unit will be set up at the downwind fenceline location. If there is no wind, or if the wind is variable, the unit will be positioned between the site and the nearest residential property. One unit will be worn be a worker deemed to be at high-risk (e.g., an equipment operator) for occupational exposure to lead.

During monitoring and sampling activities, it will be the responsibility of the field team leader to mark, maintain, and control public access to the immediate work area or equipment sampling area. To ensure safety, area(s) of the work site subject to physical hazards, such as vehicular traffic or heavy equipment activities, will be provided with traffic cones, barricade tape, and/or flagging.

E.2.4.4 Sampling Frequency

One fenceline sample will be collected daily. One personal sample will be collected daily, until three analytical results document that high-risk workers do not exceed OSHA exposure criteria for lead.

TABLE E.4

ELEMENTS by ICP (Nitric/Perchloric Acid Ashing) 7300

MW: Table 1 CAS: Table 2 RTECS: Table 2

METHOD: 7300, Issue 3 **EVALUATION:** PARTIAL **Issue 1:** 15 August 1990 **Issue 3:** 15 March 2003

OSHA: Table 2
NIOSH: Table 2
ACGIH: Table 2

PROPERTIES: Table 1

ELEMENTS:

aluminum*	calcium	lanthanum	nickel	strontium	tungsten*
antimony*	chromium*	lithium*	potassium	tellurium	vanadium*
arsenic	cobalt*	magnesium	phosphorus	tin	yittrium
barium	copper	manganese*	selenium	thallium	zinc
beryllium*	iron	molybdenum*	silver	titanium	zirconium*
cadmium	lead*				

*Some compounds of these elements require special sample treatment.

SAMPLING

SAMPLER: FILTER (0.8-µm, cellulose ester membrane, or 5.0-µm, polyvinyl chloride membrane)

FLOWRATE: 1 to 4 L/min

VOL-MIN: Table 1
-MAX: Table 1

SHIPMENT: routine

SAMPLE STABILITY: stable

BLANKS: 2 to 10 field blanks per set

ACCURACY

RANGE STUDIED: not determined

BIAS: not determined

OVERALL PRECISION ($\hat{S}_{rT}$): not determined

ACCURACY: not determined

MEASUREMENT

TECHNIQUE: INDUCTIVELY COUPLED ARGON PLASMA, ATOMIC EMISSION SPECTROSCOPY (ICP-AES)

ANALYTE: elements above

ASHING REAGENTS: conc. HNO_3/ conc. $HClO_4$ (4:1), 5 mL; 2mL increments added as needed

CONDITIONS: room temperature, 30 min; 150 °C to near dryness

FINAL SOLUTION: 4% HNO_3, 1% $HClO_4$, 25 mL

WAVELENGTH: depends upon element; Table 3

BACKGROUND CORRECTION: spectral wavelength shift

CALIBRATION: elements in 4% HNO_3, 1% $HClO_4$

RANGE: varies with element [1]

ESTIMATED LOD: Tables 3 and 4

PRECISION ($\hat{S}$): Tables 3 and 4

APPLICABILITY: The working range of this method is 0.005 to 2.0 mg/m^3 for each element in a 500-L air sample. This is simultaneous elemental analysis, not compound specific. Verify that the types of compounds in the samples are soluble with the ashing procedure selected.

INTERFERENCES: Spectral interferences are the primary interferences encountered in ICP-AES analysis. These are minimized by judicious wavelength selection, interelement correction factors and background correction [1-4].

OTHER METHODS: This issue updates issues 1 and 2 of Method 7300, which replaced P&CAM 351 [3] for trace elements. Flame atomic absorption spectroscopy (e.g., Methods 70XX) is an alternate analytical technique for many of these elements. Graphite furnace AAS (e.g., 7102 for Be, 7105 for Pb) is more sensitive.

E.2.4.5 On-Site Meteorological Station

Real-time meteorological observations maintained for wind direction and wind speed during each of the air monitoring scheduled data collection periods will negate the need for an on-site meteorological (MET) station. Meteorological data will be collected and recorded at the following six times daily:

- At the beginning of the work day;
- During each of the four air monitoring data collection periods; and
- At the end of the work day.

If staff are not able to collect meteorological observations during the air monitoring data collection periods, then a MET station containing a data logger will be set up before remediation activities begin. Site-specific meteorological conditions will be monitored daily for the complete duration of remediation. The MET station will be set to continuously monitor for wind direction and wind speed. Site-specific meteorological conditions will be reported to document upwind and downwind monitoring locations and to determine potential pollutant dispersion. The MET station will be battery-operated and located away from any disturbances, such as trees and buildings, following U.S. Environmental Protection Agency (EPA) siting guidelines.

E.2.5 PRE-MONITORING CALIBRATIONS

Monitoring and sampling equipment will be cleaned and calibrated prior to field use according to EPA or NIOSH requirements.

E.2.6 REPORTING

The removal action report will present a discussion of the air monitoring program, including interpretation of the results.

E.3 REFERENCES

California Department of Health Services (DHS), 1990. *Scientific and Technical Standards for Hazardous Waste Sites.* Toxic Substances Control Program Draft Document. August.

EPA, 1986. *Test Methods for Evaluating Solid Waste. Volume 1A: Laboratory Manual Physical/Chemical Methods.* EPA Document SW-846. Third Edition.

EPA, 1987. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD).* EPA Document EPA-450-4-87-007.

EPA, 1977. *Quality Assurance Handbook for Air Pollution Measurement Systems. Vol. II – Ambient Air Specific Methods.* EPA-600/4-77/027a. May.

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ATTACHMENT E.1

Group A Trigger Level Calculations

ATTACHMENT E.1

GROUP A TRIGGER LEVEL CALCULATIONS

ARSENIC GROUP A TL

ARSENIC Group A TRIGGER CALCULATIONS

SUBSTANCE: **ARSENIC**	PEL (mg/m^3) = 0.01	AL (mg/m^3) = 0.005	

Calculation for Total Dust Occupational Trigger Levels — Data entry

Assumptions:

1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =	=	253
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)	=	0.000253
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]	=	0.005

Calculations:

1. The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)
Formula	=	0.005	/	0.000253
Result	=	**19.76**	**mg/m^3**	

2. The trigger level for allowable dust in air is 50% of the allowable dust concentration or:

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%
Formula	=	19.76	*	50%
Result	=	**9.88**	**mg/m^3**	

BERYLLIUM GROUP A TL

BERYLLIUM Group A TRIGGER CALCULATIONS

SUBSTANCE:	BERYLLIUM	PEL (mg/m^3) =	0.002	AL (mg/m^3) =	NA

Calculation for Total Dust Occupational Trigger Levels — Data entry

Assumptions:

1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =	=	48.8
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)	=	0.0000488
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]	=	0.001

Calculations:

1. The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)
Formula	=	0.001	/	0.0000488
Result	=	**20.49**	**mg/m^3**	

2. The trigger level for allowable dust in air is 50% of the allowable dust concentration or:

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%
Formula	=	20.492	*	50%
Result	=	**10.25**	**mg/m^3**	

CADMIUM GROUP A TL

CADMIUM Group A TRIGGER CALCULATIONS

SUBSTANCE:	CADMIUM	PEL (mg/m^3) =	0.005	AL (mg/m^3) =	0.0025

Calculation for Total Dust Occupational Trigger Levels — Data entry

Assumptions:

1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =	=	166
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)	=	0.000166
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]	=	0.0025

Calculations:

1. The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)
Formula	=	0.0025	/	0.000166
Result	=	**15.060**	**mg/m^3**	

2. The trigger level for allowable dust in air is 50% of the allowable dust concentration or:

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%
Formula	=	15.060	*	50%
Result	=	**7.530**	**mg/m^3**	

LEAD GROUP A TL

LEAD Group A TRIGGER LEVEL (TL) CALCULATIONS

SUBSTANCE:	**LEAD**		PEL (mg/m^3) =	0.05	AL (mg/m^3) =	0.03	

Calculation for Total Dust Occupational Trigger Levels

Data entry

Assumptions:

1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =	=	9520
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)	=	0.00952
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]	=	0.03

Calculations:

1. The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)
Formula	=	0.03	/	0.00952
Result	=	**3.151**	**mg/m^3**	

2. The trigger level for allowable dust in air is 50% of the allowable dust concentration or:

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%
Formula	=	3.151	*	50%
Result	=	**1.576**	**mg/m^3**	

SUBSTANCE:	LEAD	CA/NAAQS=	0.0015

Calculation for Total Dust Ambient Air Quality Trigger Levels

Ref. field

Assumptions:

1.	Maximum SUBSTANCE concentration in soil (mg/kg) =	9520
2.	Maximum SUBSTANCE concentration in dust (mg SUBSTANCE /mg dust)	0.00952
3.	Allowable lead concentration in air = California Ambient Air Quality Standards (CAAQS) =	0.0015

Calculations:

1. The allowable dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust
Formula	=	0.0015	/	0.00952
Result	=	**0.16**	**mg/m^3**	

2. The trigger level for allowable dust in air is the allowable dust concentration for a 10-hr period. Since the CA/NAAQS is a 24-hr value, the trigger calculation assumes site operations generate emissions for 10 out of 24 hrs daily, assuming no emissions

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	24	/	10
Formula	=	0.16	*	2.4		
Result	=	**0.378**	**mg/m^3**			

ATTACHMENT E.2

Group B Trigger Level Calculations

ATTACHMENT E.2

GROUP B TRIGGER LEVEL CALCULATIONS

ARSENIC GROUP B TL

ARSENIC Group B TRIGGER CALCULATIONS

SUBSTANCE:	**ARSENIC**	PEL (mg/m^3) = 0.01	AL (mg/m^3) = 0.005

Calculation for Total Dust Occupational Trigger Levels — Data entry

Assumptions:

1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =	=	1400
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)	=	0.0014
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]	=	0.005

Calculations:

1. The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)
Formula	=	0.005	/	0.0014
Result	=	**3.57**	**mg/m^3**	

2. The trigger level for allowable dust in air is 50% of the allowable dust concentration or:

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%
Formula	=	3.57	*	50%
Result	=	**1.79**	**mg/m^3**	

CADMIUM GROUP B TL

CADMIUM Group B TRIGGER CALCULATIONS

SUBSTANCE:	CADMIUM	PEL (mg/m^3) =	0.005	AL (mg/m^3) =	0.0025

Calculation for Total Dust Occupational Trigger Levels

Data entry

Assumptions:

1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =	=	707
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)	=	0.000707
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]	=	0.0025

Calculations:

1. The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:

Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)
Formula	=	0.0025	/	0.000707
Result	=	**3.536**	**mg/m^3**	

2. The trigger level for allowable dust in air is 50% of the allowable dust concentration or:

Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%
Formula	=	3.536	*	50%
Result	=	**1.768**	**mg/m^3**	

LEAD GROUP B TL

LEAD Group B TRIGGER LEVEL (TL) CALCULATIONS

	SUBSTANCE:	**LEAD**		PEL (mg/m^3) =	0.05	AL (mg/m^3) =	0.03
Calculation for Total Dust Occupational Trigger Levels							Data entry
Assumptions:							
1.	Maximum **SUBSTANCE** concentration in soil (mg/kg) =					=	66100
2.	Maximum **SUBSTANCE** concentration in dust (mg **SUBSTANCE** /mg dust)					=	0.0661
3.	Allowable **SUBSTANCE** concentration in air (mg/m^3) [using AL or 1/2 PEL]					=	0.03
Calculations:							
1.	The allowable [using AL or 1/2 PEL] dust concentration in air is calculated as:						
		Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust (mg/mg)	
		Formula	=	0.03	/	0.0661	
		Result	=	**0.454**	**mg/m^3**		
2.	The trigger level for allowable dust in air is 50% of the allowable dust concentration or:						
		Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	50%	
		Formula	=	0.454	*	50%	
		Result	=	**0.227**	**mg/m^3**		
	SUBSTANCE:	LEAD		CA/NAAQS=	0.0015		
Calculation for Total Dust Ambient Air Quality Trigger Levels							Ref. field
Assumptions:							
1.	Maximum SUBSTANCE concentration in soil (mg/kg) =						66100
2.	Maximum SUBSTANCE concentration in dust (mg SUBSTANCE /mg dust)						0.0661
3.	Allowable lead concentration in air = California Ambient Air Quality Standards (CAAQS) =						0.0015
Calculations:							
1.	The allowable dust concentration in air is calculated as:						
		Allowable dust concentration (mg/m^3)	=	Allowable SUBSTANCE concentration in air (mg/m^3)	/	Concentration of SUBSTANCE in dust	
		Formula	=	0.0015	/	0.0661	
		Result	=	**0.02**	**mg/m^3**		
2.	The trigger level for allowable dust in air is the allowable dust concentration for a 10-hr period. Since the CA/NAAQS is a 24-hr value, the trigger calculation assumes site operations generate emissions for 10 out of 24 hrs daily, assuming no emissions						
		Trigger level for dust in air (mg/m^3)	=	Allowable dust concentration (mg/m^3)	*	24	/ 10
		Formula	=	0.02	*	2.4	
		Result	=	**0.054**	**mg/m^3**		

APPENDIX F

Cultural Resources Records Search

CALIFORNIA
HISTORICAL
RESOURCES
INFORMATION
SYSTEM

FRESNO
KERN
KINGS
MADERA
TULARE

Southern San Joaquin Valley
Archaeological Information Center
California State University, Bakersfield
9001 Stockdale Highway
31 MW
Bakersfield, California 93311-1022
(661) 654-2289 FAX (661) 654-2415
E-mail: abaldwin@csub.edu

TO: Amir Matin, Project Manager
URS Corporation
2870 Gateway Oaks Drive, Suite 300
Sacramento, CA 95833

(RS # 06-032)

DATE: March 9, 2006

PRIORITY

RE: Osage Industries Site, 60th Street West, Rosamond, CA

County: Kern

Map(s): Rosamond, Little Buttes, Willow Springs, Soledad Mtn. 7.5's

CULTURAL RESOURCES RECORDS SEARCH

The Southern San Joaquin Valley Information Center is under contract to the State Office of Historic Preservation and is responsible for the local management of the California Historical Resources Inventories. The following are the results of a search of the cultural resources files at the Southern San Joaquin Valley Archaeological Information Center. These files include known and recorded archaeological and historic sites, inventory and excavation reports filed with this office, and properties listed on the National Register of Historic Places, The Historic Property Data File, (8/8/05), the California Register, the California Historical Landmarks, the California Inventory of Historic Resources, and the California Points of Historical Interest.

PRIOR CULTURAL RESOURCE SURVEYS CONDUCTED WITHIN THE PROJECT AREA AND A ONE-MILE RADIUS

According to the information in our files, there have been no cultural resource studies conducted within the project area. There have been (2) two cultural resource surveys conducted within a ½ mile radius and (2) two surveys within a one-mile radius. See the enclosed map for survey locations and report designations.

RECORDED CULTURAL RESOURCES WITHIN THE PROJECT AREA AND A ONE-MILE RADIUS

There are no recorded cultural resources within the project area and it is not known if resources exist there. There are (11) eleven recorded cultural resources within a ½ mile radius and (8) eight resources within a one-mile radius. See the enclosed map for resource locations and their associated Primary numbers.

PRIORITY

(RS # 06-032)

There are no cultural resources within the project area that are listed on the National Register of Historic Places, the California Register, California Points of Historical Interest, California Inventory of Historic Resources, and California State Historic Landmarks.

COMMENTS

Copies of all report title pages are enclosed. Also enclosed are complete copies of the cultural resource site records for the resources within a one-mile radius. If you need any additional information or have any questions, please don't hesitate to contact me at (661) 654-2289. We apologize for the delay in processing your request. The Information Center has been completely inundated with work for the last 14 months with no let up in sight.

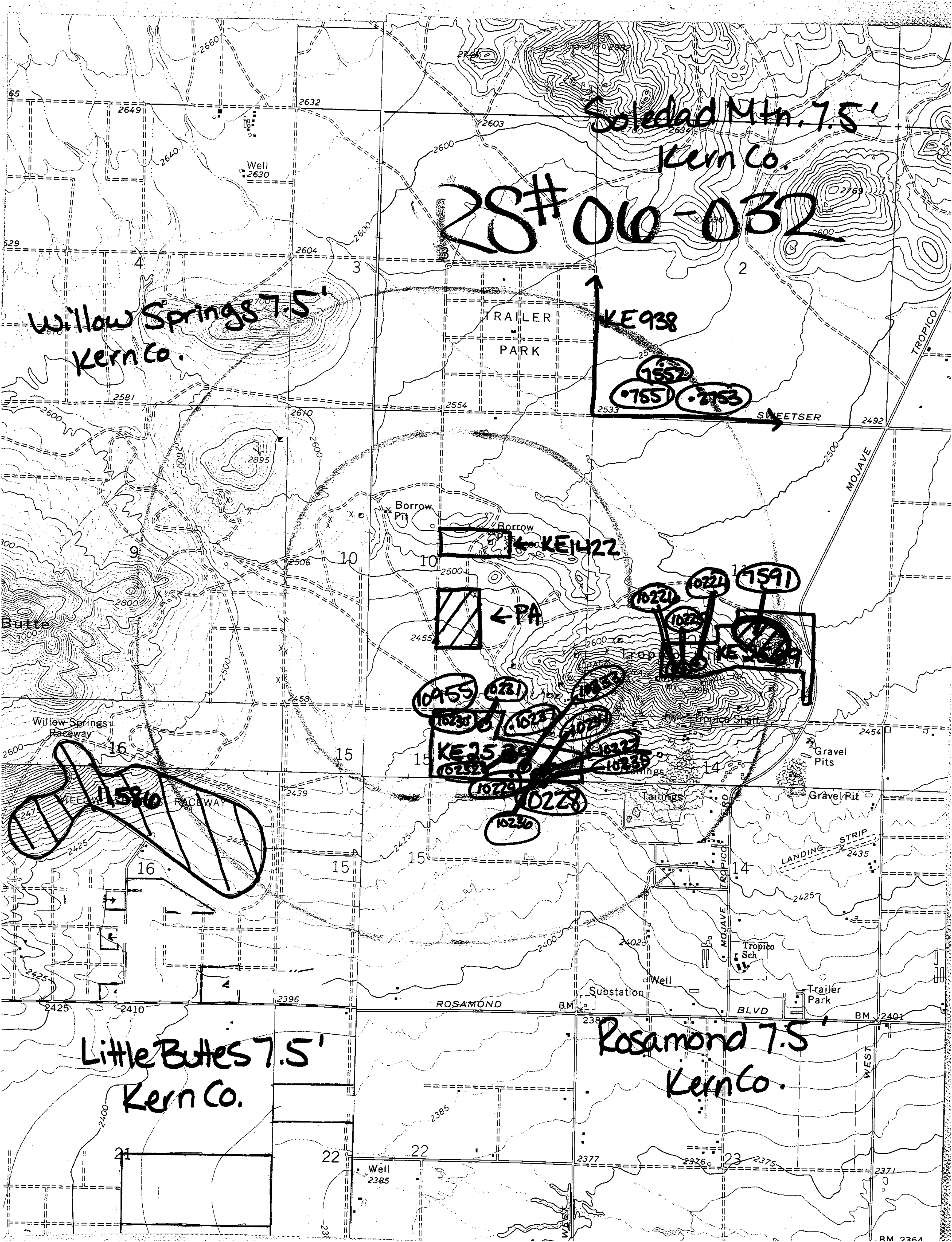
By Adele B

Adele Baldwin
Assistant Coordinator

Date: March 9, 2006

Fee: $180.00/hr. (Priority Service)

Invoice # A3736



Soledad Mtn. 7.5'
Kern Co.
28#010-032
Willow Springs 7.5'
Kern Co.
KE938
7552
7551
7553
SWEETSER
TRAILER
PARK
Borrow Pit
KE1422
PA
7591
KE2539
KE2539
10228
Tropico Shaft
Willow Springs Raceway
RACEWAY
Gravel Pits
Gravel Pit
Tailings
LANDING STRIP
MOJAVE
TROPICO
Tropico Sch
Well
Substation
Trailer Park
ROSAMOND
BLVD
Little Buttes 7.5'
Kern Co.
Rosamond 7.5'
Kern Co.
WEST

1141450

1141450

An Archaeological Assessment of 260 Acres of Land Northwest of Rosamond, Kern County, California

Prepared by:

Catherine Lewis Pruett
Assistant Director

Cultural Resource Facility
California State University
9001 Stockdale Highway
Bakersfield, California 93311-1099

CRF-90-61b

Dr. Mark Q. Sutton
Director

Prepared for:

Helt Engineering, Inc.
2930 Union Avenue
Bakersfield, California 93305

May 1990

KE-00938

ARCHAEOLOGICAL INVESTIGATION

OF

PARCEL MAP NO. 9556

SECTION 10, T.9N, R.13W.

KERN COUNTY, CALIFORNIA

Prepared by:

Robert A. Schiffman
Bakersfield College
1801 Panorama Drive
Bakersfield, CA 93306
(805) 395-4391

NOVEMBER 12, 1991

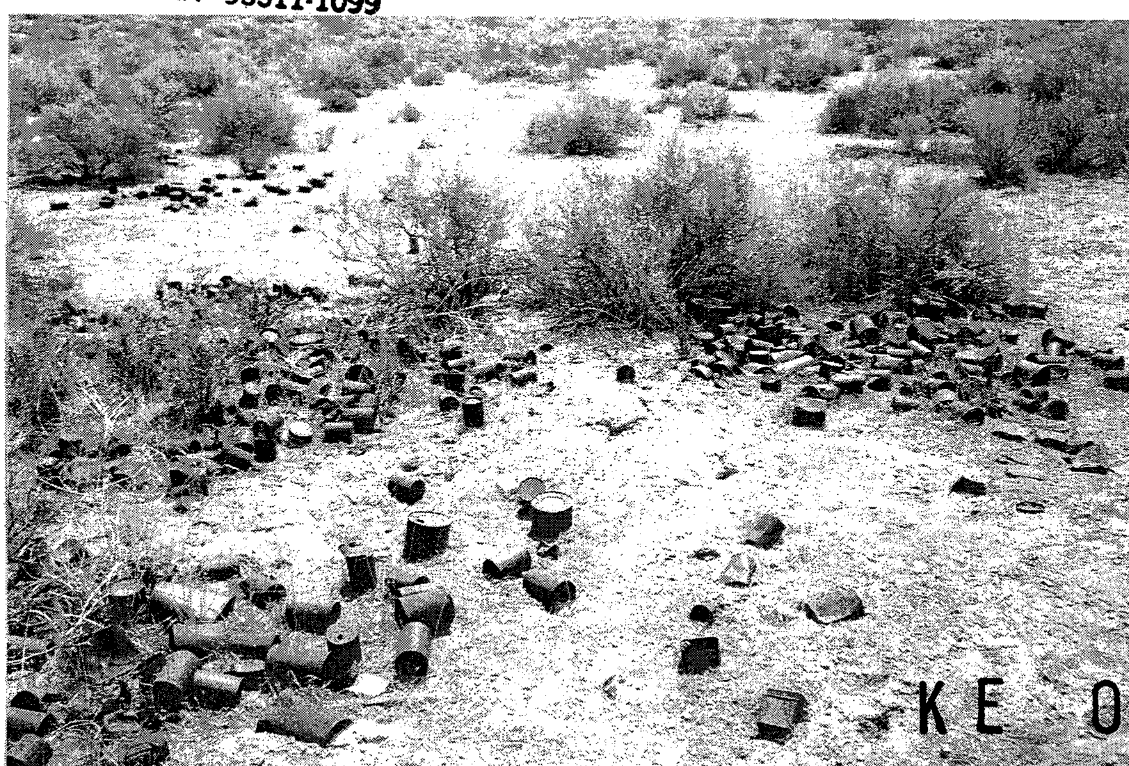
Survey and Evaluation Report

For

Proposed Acton Phase I Land Exchange Near Tropico Mine

Prepared by

Sarah C. Cunkelman
Barstow Field Office
May 2001



P-15-002753

ARCHAEOLOGICAL
ARCHAEOLOGICAL SITE RECORD
Cultural Resource Facility
California State University
9001 Stockdale Highway
Bakersfield, California 93311-1099

Permanent Trinomial: CA-KER-2753H
Temporary Designation: Helt No. 2

1. **County:** Kern
2. **USGS Quad:** Soledad Mt. 7.5' **dated:** 1973
3. **UTM Coordinates: Zone 11:** 387425 **mE** 3861785 **mN**
4. **Twp.** 9N, **Rng.** 13W, **MDBM**, NE 1/4, SW 1/4, SE 1/4, SW 1/4 **Section** 2
5. **Map Coordinates:** 487 **mmS** 70 **mmE** 6. **Elevation:** 2,530'
7. **Location:** 540 meters east of unnamed dirt road and 140 meters north of Sweetser Road
8. **Prehistoric:** **Historic:** XXX **Protohistoric:**
9. **Site Description:** Historic trash scatter
10. **Area:** 5 **m.(N/S)** x 5 **m.(E/W); Method of Determination:** Estimated from sketch map
11. **Depth:** Unknown
12. **Features:** None
13. **Artifacts:** Cans, glass (not purple), crockery
14. **Non-artifactual Constituents:** None
15. **Date Recorded:** 4-24-90
16. **Recorder:** C. Pruett
17. **Affiliation and Address:** Cultural Resource Facility, Calif. State Univ., Bakersfield
18. **Human Remains:** None
19. **Site Integrity:** Good
20. **Nearest Water:** Unknown
21. **Vegetation Community (site vicinity):** Cresote bush scrub
22. **Vegetation (on site):** saltbush
23. **Soil:** brown sandy gravel
24. **Surrounding Soil:** same
25. **Geology:** alluvium debris
26. **Landform:** valley floor
27. **Slope:** less than 2%
28. **Exposure:** open
29. **Landowner and Address:** private

P-15-002753

ARCHAEOLOGICAL SITE RECORD (continued)

Permanent Trinomial: CA-KER-2753H
Temporary Designation: Helt No. 2

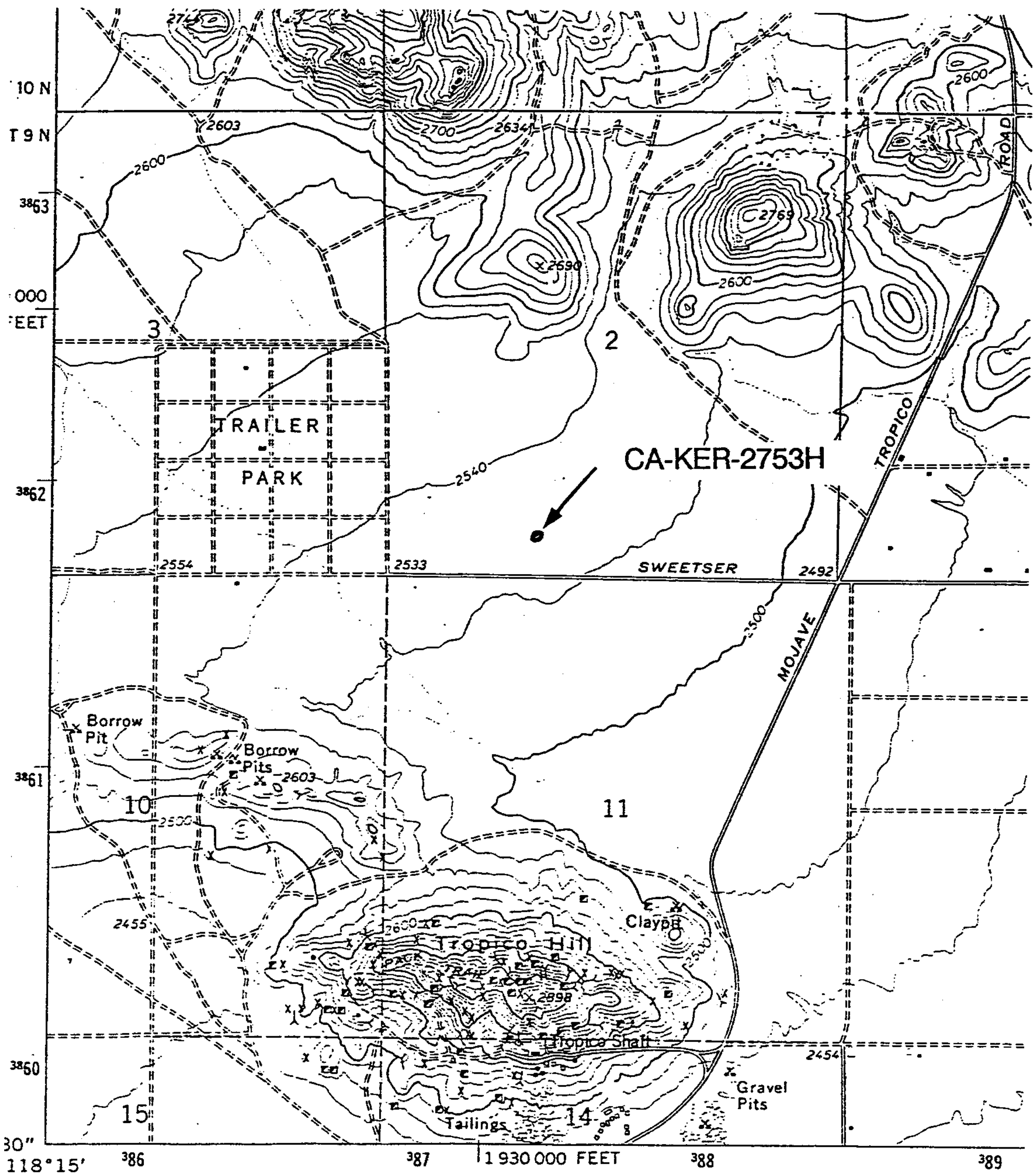
30. **Remarks:** None
31. **References:** None
32. **Name of Project:** survey (CRF 90-61) for Helt Eng.
33. **Type of Investigation:** Surface survey
34. **Site Accession Number:** No collection made — **Stored at:** N/A
35. **Photos:** None — **Taken by:** N/A
36. **Photo Accession #:** N/A — **On File at:** N/A

P-15-002753

ARCHAEOLOGICAL SITE LOCATION MAP

Permanent Trinomial: CA-KER-2753H
Temporary Site No.: Helt No. 2
USGS Map: Soledad Mt. 7.5'

Page 3 **of** 3 .



ISOLATE RECORD
Cultural Resource Facility
California State University
9001 Stockdale Highway
Bakersfield, CA 93311-1099

P 1 5 - 0 0 7 5 5 1]

INFORMATION CENTER NO.: IF-KER-620
Temporary No.: If No. 4

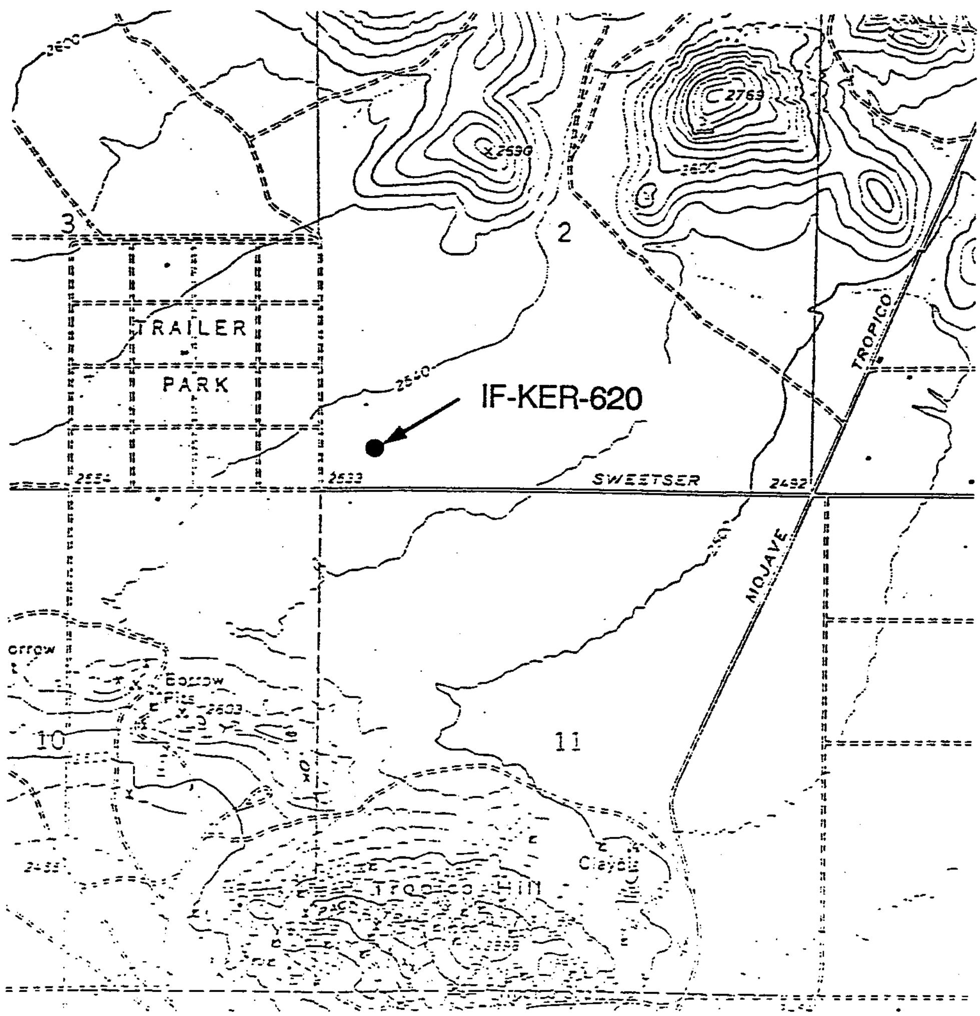
1. **County:** Kern
2. **USGS Quad:** Soledad Mtn. 7.5' **dated** 1973
3. **UTM Coordinates: Zone 11:** 387070 **mE** 3861780 **mN**
4. **Twp.** 9N, **Rng.** 13W, **MDBM**, E 1/2, SW 1/4, SW 1/4, SW 1/4 **Section** 2
5. **Map Coordinates:** 495 **mmS** 55 **mmE**
6. **Elevation:** 2,520'
7. **Location:** 105 meters north of Sweetser Road and 150 meters east of unnamed dirt road
8. **Description:** two red banded rhyolite flakes, not collected
9. **Nearest Water:** unknown
10. **Vegetation Community:** cresote bush scrub
11. **Landform:** valley floor
12. **Geology:** alluvium
13. **Exposure:** open
14. **Slope:** less than 2%
15. **Landowner and Address:** private
16. **Remarks:** isolate was not collected
17. **References:** none
18. **Name and Type of Project:** survey (CRF 90-61) for Helt Eng.
19. **Photos:** none taken
20. **Photo Accession #:** N/A
21. **Date Recorded:** 5-4-90
22. **Recorders:** C. Pruett
23. **Affiliation and Address:** Cultural Resource Facility California State University, Bakersfield
24. **Stored at:** nothing collected

ISOLATE LOCATION MAP

P 15-007551

INFORMATION CENTER NO.: IF-KER-620
Temporary No.: If No. 4
USGS Map: Soledad Mtn. 7.5'
Recorder: C. Pruett

Page 2 of 2.



P 15-007552

ISOLATE RECORD
Cultural Resource Facility
California State University
9001 Stockdale Highway
Bakersfield, CA 93311-1099

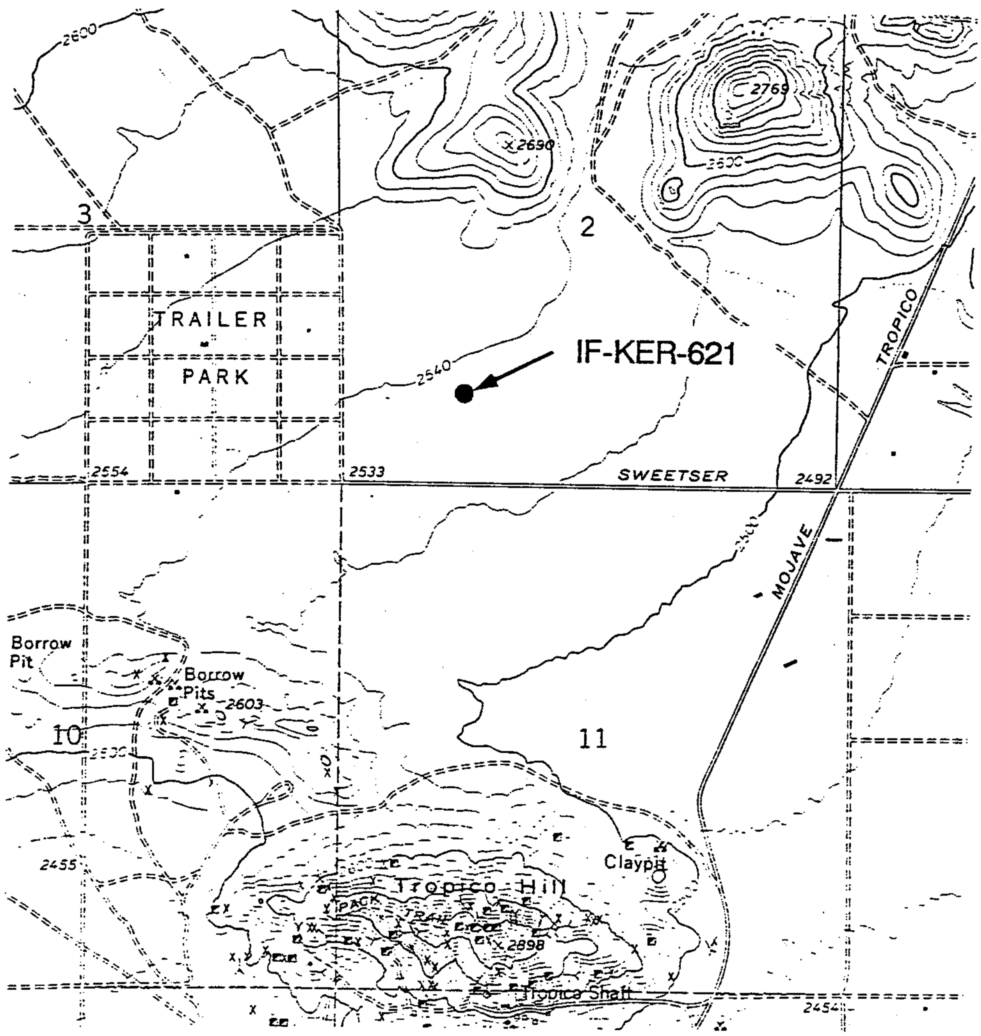
INFORMATION CENTER NO.: IF-KER-621
Temporary No.: If No. 5

1. **County:** Kern
2. **USGS Quad:** Soledad Mtn. 7.5' **dated** 1973
3. **UTM Coordinates: Zone 11:** 387307 **mE** 3862965 **mN**
4. **Twp.** 9N, **Rng.** 13W, **MDBM**, E 1/2, NE 1/4, SW 1/4, SW 1/4 **Section** 2
5. **Map Coordinates:** 482 **mmS** 65 **mmE**
6. **Elevation:** 2,535'
7. **Location:** 295 meters north of Sweetser Road and 350 meters east of an unnamed dirt road
8. **Description:** one small red-banded rhyolite flake was found
9. **Nearest Water:** unknown
10. **Vegetation Community:** creosote bush scrub
11. **Landform:** valley floor
12. **Geology:** alluvium
13. **Exposure:** open
14. **Slope:** less than 2%
15. **Landowner and Address:** private
16. **Remarks:** isolate was not collected
17. **References:** none
18. **Name and Type of Project:** survey (CRF 90-61) for Helt Eng.
19. **Photos:** none taken
20. **Photo Accession #:** N/A
21. **Date Recorded:** 5-4-90
22. **Recorders:** C. Pruett
23. **Affiliation and Address:** Cultural Resource Facility California State University, Bakersfield
24. **Stored at:** nothing collected

P 15-007552

ISOLATE LOCATION MAP

INFORMATION CENTER NO.: IF-KER-621
Temporary No.: If No. 5
USGS Map: Soledad Mtn. 7.5'
Recorder: C. Pruett



DEPARTMENT OF PARKS AND RECREATION

POINT OF HISTORICAL INTEREST

Reg. No. Ker-001
Date 6-2-68
By [illegible]

County: Kern

Name: Clay Pits

Location: Near Tropico Gold Camp, near Rosamond

P15-007591

Historical Significance:

Dr. L. A. Crandall, in 1880, found clay deposits on the north side of the hill, later known as Tropico Hill. Clay was shipped to pottery plants in the Los Angeles area. In 1894, Ezra Hamilton found gold on the hill, a major discovery.

THIS POINT OF HISTORICAL INTEREST IS <u>NOT</u> A STATE REGISTERED HISTORICAL LANDMARK.

RECOMMENDED:	APPROVED:
[illegible] M. Jackson Signature—VICE Chairman, County Board of Supervisors	R. Coke Wood Signature—Chairman, Historical Landmarks Advisory Committee
Date 5-14-68	Date 6/2/68

DPR-147 (4-66) 68335-768 4-66 5M TRIP ② OSP

SPHI - KER-001

P 15-007591

Points of Historical Interest
Kern County

Number	Date	Name	Location
KER-001	6-2-68	Clay Pits	Near Tropico Gold Camp.
KER-002	6-2-68	Twenty Mule Team Road	California City.
KER-003	1-13-77	Jameson 17-24-C Oil Well	Corner of Wood Street and State Highway 33, Taft.
KER-004	12-19-80	Kern County Museum and Pioneer Village	3801 Chester Avenue, Bakersfield.
KER-005	12-19-80	The Fort, Taft	Corner of N. 10th Street and W. Ash, Taft.
KER-006	6-9-82	Union Ice Company Plant No. 6	33rd Street and Chester Avenue, Bakersfield.
KER-007	1-14-83	Jastro Building / Standard Oil Building	19th and G Streets, Bakersfield.
KER-008	11-28-86	Walker Basin	Walker Basin Road, Caliente.
KER-009	11-28-86	Green Hotel, Shafter Hotel	530 James Street, Shafter.

JOSIE BISHOP MINING CLAIM SITE
Cantil vicinity, Kern County

Jan. 1995

Maryln Lortie presented the staff report recommending granting Point of Historical Interest status.

Commissioner Hoover moved and Commissioner Cameron seconded the motion to adopt staff recommendation and to grant Point of Historical Interest status to the Josie Bishop Mining Claim Site.

City of Paris Building, San Francisco. Built in 1896, it survived the 1906 Earthquake.

CITRUS MACHINERY PIONEERING, *RIVERSIDE COUNTY.* THE EFFORTS OF FRED STEBLER, GEORGE D. PARKER AND HALE PAXTON MODERNIZED THE CITRUS AND FRUIT PACKING INDUSTRY OF RIVERSIDE. THESE THREE PIONEER FIRMS WERE LATER COMBINED ON THIS SITE IN 1938 UNDER FOOD MACHINERY CORPORATION. POINT OF HISTORICAL INTEREST.

CITY OF PARIS BUILDING, *SAN FRANCISCO, SAN FRANCISCO COUNTY.* 1896. ELEGANT NEO-CLASSICAL EXTERIOR WHICH SURVIVED THE 1906 EARTHQUAKE INTACT. INTERIOR DAMAGED AND COMPLETELY REDONE BY THREE ECOLE DES BEAUX ARTS GRADUATES WHO PRODUCED A FOUR-STORY ELLIPTICAL ROTUNDA, THOUGHT TO BE THE ONLY ONE OF ITS TYPE IN EXISTENCE, TOPPED BY AN OVOID-SHAPED LEADED STAINED GLASS DOME. WHILE THE CITY OF PARIS BUILDING IS ONE OF SEVENTEEN BUILDINGS IN SAN FRANCISCO'S DOWNTOWN TO SURVIVE THE EARTHQUAKE AND FIRE OF 1906, ITS OUTSTANDING INTERIOR ROTUNDA REPRESENTS ARCHITECTURALLY THE POST-QUAKE VIGOR, OPTIMISM, AND ELEGANCE WITH WHICH SAN FRANCISCO REBUILT ITSELF. THE CITY OF PARIS BUILDING IS ALSO ONE OF ONLY THREE REMAINING STRUCTURES IN SAN FRANCISCO HAVING A DIRECT LINK WITH THE CALIFORNIA GOLD RUSH, HAVING HOUSED THE VERDIERS' FRENCH IMPORTED DRY GOODS STORE, WHICH WAS FOUNDED ON BOARD THE SHIP VILLE DE PARIS 125 YEARS AGO. NATIONAL REGISTER. OWNERSHIP: PRIVATE.

CLAPBOARDTOWN, *SAN BERNARDINO COUNTY.* CONSTRUCTED IN THE EARLY 1860'S, IN THE HOLCOMB VALLEY MINING DISTRICT LOCATED 6 MILES NORTH OF BEAR VALLEY.

CLARKE'S/WILSON'S LANDING, *PALO ALTO, SANTA CLARA COUNTY.* JEREMIAH CLARKE ESTABLISHED A BOAT LANDING HERE IN 1873 TO TRANSPORT PRODUCTS TO SAN FRANCISCO MARKETS. IN 1878, HE LEASED THE LANDING TO CAPTAIN CHARLES G. WILSON, WHO OPERATED IT THROUGHOUT THE 80'S AND 90'S UNTIL RAIL TRANSPORTATION MADE HIS BUSINESS UNPROFITABLE. POINT OF HISTORICAL INTEREST.

CLAY PITS, *KERN COUNTY.* IN 1880, CLAY DEPOSITS WERE FOUND ON A NORTH SIDE OF TROPICO HILL BY DOCTOR L. A. CRANDALL. POINT OF HISTORICAL INTEREST.

CLAY STREET BANK SITE, *SAN FRANCISCO, SAN FRANCISCO COUNTY.* THREE STORY BRICK WITH CAST IRON FRONT IN LAVISH ITALIANATE MANNER. ARCHED DOORS, HEAVY BRACKETED CORNICE. BUILT PRIOR TO 1865. HOUSED FINANCIAL INSTITUTIONS. HABS CAL-1744.

CLAY STREET-HILL RAILROAD, *SAN FRANCISCO, SAN FRANCISCO COUNTY.* THE CLAY STREET HILL RAILROAD COMPANY WAS THE FIRST CABLE RAILROAD SYSTEM IN THE WORLD AND WAS INVENTED AND INSTALLED BY ANDREW S. HALLIDIE. IT STARTED OPERATION ON AUGUST 1, 1873, AND CEASED ON FEBRUARY 15, 1942. CALIFORNIA HISTORICAL LANDMARK. OWNERSHIP: STATE.

CLAYTON TOWN SITE (SEE EXPLORATION/SETTLEMENT)

CLEAR CREEK, *SHASTA COUNTY.* SITE OF THE DISCOVERY OF GOLD BY MAJOR PIERSON B.READING AND HIS INDIAN LABORERS, 1848. CALIFORNIA HISTORICAL LANDMARK. OWNERSHIP: STATE.

CLINTON (SEE EXPLORATION/SETTLEMENT)

CLIPPER GAP, *PLACER COUNTY.* CLIPPER GAP WAS A MANUFACTURING AND DISTRIBUTION CENTER FOR BLACK POWDER USED IN THE MINES OF PLACER COUNTY. THE TOWN LATER PROSPERED FROM BOX MANUFACTURING AND AS A SHIPPING POINT FOR IRON ORE. SEVERAL OF THE EARLY BUILDINGS STILL STAND, INCLUDING THE OLD SCHOOLHOUSE WHICH WAS BUILT CIRCA 1900. POINT OF HISTORICAL INTEREST.

COACHELLA VALLEY COUNTY WATER DISTRICT, *RIVERSIDE COUNTY.* THE DISTRICT WAS ESTABLISHED BY VOTERS JANUARY, 1918 TO CONSERVE GROUND WATERS AND SEEK SUPPLEMENTAL WATER FROM THE COLORADO RIVER. THIS HEADQUARTERS SITE WAS OCCUPIED IN 1938. WATER WAS FIRST DELIVERED IN 1947 THROUGH THE COACHELLA BRANCH OF THE ALL AMERICAN CANAL. POINT OF HISTORICAL INTEREST.

COALING STATION A, *COALINGA, FRESNO COUNTY.* PROPERTY OF THE SAN JOAQUIN COAL MINING COMPANY, AND LOCATED AT THE INTERSECTION OF THEIR PRIVATE RAILROAD LINE WITH THE MAIN LINE. COAL WENT TO STEAM PLANTS THROUGHOUT THE SAN JOAQUIN VALLEY AND TO THE LOS ANGELES CABLE CAR COMPANY. POINT OF HISTORICAL INTEREST.

COE RANCH, *SANTA CLARA COUNTY.* ONE OF AREA'S EARLIEST RANCHES, OUTBUILDINGS DATE FROM 1870'S. INCLUDED RANCH HOUSE, COOK HOUSE, BUNKHOUSE, ROCK COOLER, AND REMAINS OF MADRONE SPRINGS RESORT. NOW HENRY W. COE MEMORIAL STATE PARK. OWNERSHIP: STATE. ADMINISTRATION: STATE PARK.

COHEN,(A.A.) HOTEL SITE (SEE SOCIAL/EDUCATION)

COLOMA AND MARSHALL GOLD DISCOVERY AREA, *EL DORADO COUNTY.* 1848. SITE OF STATE'S FIRST GOLD STRIKE; CONTAINS MONUMENT MARKING DISCOVERY SITE, FOUNDATIONS OF SUTTER'S MILL (SEE ALSO SUTTER'S MILL, CA), NEARBY RECONSTRUCTION OF MILL, OTHER MILL STRUCTURES, AND 13 BRICK BUILDINGS FROM ORIGINAL SETTLEMENT WHICH BECAME FIRST WHITE SETTLEMENT IN SIERRA NEVADA FOOTHILLS. DISCOVERY MADE BY JAMES MARSHALL, EMPLOYEE OF LAND BARON JOHN A. SUTTER, SPARKED RAPID SETTLEMENT AND DEVELOPMENT OF WEST. NATIONAL REGISTER. OWNERSHIP: STATE.

COLOMA ROAD, COLOMA, *EL DORADO COUNTY.* HERE IN THE VALLEY OF THE CUL-LUH-MAH INDIANS, JAMES W. MARSHALL DISCOVERED GOLD ON JANUARY 24, 1848, IN THE TAILRACE OF SUTTER'S SAWMILL. THE OLD COLOMA ROAD, OPENED IN 1847 FROM SUTTER'S FORT TO COLOMA, WAS USED BY MARSHALL TO CARRY THE NEWS OF THE DISCOVERY TO CAPTAIN JOHN A. SUTTER. DURING THE GOLD RUSH IT WAS USED BY THOUSANDS OF MINERS GOING TO AND FROM THE DIGGINGS. IN 1849 IT BECAME THE ROUTE OF CALIFORNIA'S FIRST STAGELINE, ESTABLISHED BY JAMES E. BIRCH. CALIFORNIA HISTORICAL LANDMARK. OWNERSHIP: COUNTY.

STREET.ADDRESS	NAMES	CITY.NAME	OWN	YR-C	C	#PR	OTHREG	CHL#	PROP-#	OHP-PROG..	PRG-REFERENCE-NUMBER	STAT-DAT	NRS	CRIT
GRAPEVINE RD	SEBASTIAN INDIAN RESERVATION; RANCHO	(VIC) METTLER	P		C		S	133	089977	HIST.RES.	SHL-0133-0000	01/31/34	7L	
SR 166	FAGES-ZALVIDEA CROSSING	(VIC) METTLER	S		C		S	291	090049	HIST.RES.	SHL-0291-0000	06/27/38	7L	
SR 166	BR. 50-31	(VIC) METTLER	S	1929	S		H		052152	HIST.SURV.	3301-0001-0000		6	
	AT & SF 560-H SEGMENT OF TRACK AND TI	MOJAVE	P	1882	S				113397	HIST.RES.	DOE-15-97-0212-0000	12/22/97	6Y2	
										PROJ.REVW.	BLM970325A	12/22/97	6Y2	
15959 L ST		MOJAVE	P	1921	B				099933	PROJ.REVW.	HUD951218G	01/09/96	6Y2	
16060 L ST		MOJAVE	U	1930	B	0		0	067493	PROJ.REVW.	HUD900618G	07/18/90	6Y2	
SIERRA SR	20-MULE-TEAM BORAX TERMINUS	MOJAVE	P		C		S	652	090597	HIST.RES.	SHL-0652-0000	07/01/58	7L	
WHITE ROCK CREEK	CHINESE LIME KILN, SITE OF CHINESE LI	MONOLITH	P	1900	C				052384	HIST.SURV.	3548-0001-0000		7	
0	EDISON KERN RIVER POWER HOUSE	OILDALE	U		B				068370	PROJ.REVW.	FHWA881212A	01/09/89	2	A
603 BELMONT AVE		OILDALE	P	1920	B				097143	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
607 BELMONT AVE		OILDALE	P	1920	B				097142	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
607 BELMONT AVE		OILDALE	P		B				097141	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
613 BELMONT AVE		OILDALE	P		B				097140	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
806 DECATUR ST		OILDALE	P		B				097147	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
812 DECATUR ST		OILDALE	P		B				097146	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
814 DECATUR ST		OILDALE	P		B				097145	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
816 DECATUR ST		OILDALE	P		B				097144	PROJ.REVW.	HUD950710D	08/09/95	6Y2	
323 FRANCIS ST	NAME UNKNOWN	OILDALE	U		B				069866	PROJ.REVW.	HUD860423D	05/23/86	6Y	
SR 204	BR. 50-129	OILDALE	S	1933	S		H		052378	HIST.SURV.	3308-0002-0000		6	
323 W HARDING AVE	D PARKER RESIDENCE	OILDALE	U		B				064762	PROJ.REVW.	HUD860626L	08/03/86	6Y	
WILLOW DR	NAME UNKNOWN	OILDALE	U		O				068211	PROJ.REVW.	HUD880919P	10/19/88	6Y	
SR 204	BR. 50-130	(VIC) OILDALE	S	1933	S		H		052379	HIST.SURV.	3308-0003-0000		6	
SR 99	BR. 50-51	(VIC) OILDALE	S	1934	S		H		052377	HIST.SURV.	3308-0001-0000		6	
SR 99	BR. 50-132	(VIC) OILDALE	S	1933	S		H		052380	HIST.SURV.	3308-0004-0000		6	
	RAND MINING DISTRICT; RANDSBURG; RAND	RANDSBURG	P	1895	D		S	938	052385	HIST.RES.	SHL-0938-0000	01/15/81	7L	
BUTTE AVE	RANDSBURG FIRE STATION	RANDSBURG	U	1941	B				084999	PROJ.REVW.	HUD920312E	12/13/93	6Y2	
	CA-INY-174	RIDGECREST	F	0	C				073339	NAT.REG.	14-0003	08/01/89	7J	
500 W RIDGECREST BLVD	JOHN MCNEIL MILK HOUSE, WATER METER T	RIDGECREST	C	1914	B				052386	HIST.SURV.	3555-0001-0000		3S	
	SUGARLOAF ARCHEOLOGICAL DISTRICT, COS	(VIC) RIDGECREST	F	0	D	566			073341	NAT.REG.	14-0004	12/24/90	7J	
3500 75TH ST	WILLOW SPRINGS INTERNATIONAL RACEWAY	ROSAMOND	P	1953	S				094728	ST.PT.INT.	15-0010	03/20/95	7J	
TRUMAN-MANLY RD	WILLOW SPRINGS	ROSAMOND	P		C		S	130	089975	HIST.RES.	SHL-0130-0000	01/31/34	7L	
	CLAY PITS	(VIC) ROSAMOND	U		C		C		090750	HIST.RES.	SPHI-KER-001	06/04/68	7L	
179 BETH EDEN	RESID REHAB	SHAFTER	U		B				065832	PROJ.REVW.	HUD890515A	05/25/89	6Y	
150 CENTRAL VALLEY HWY	SANTA FE DEPOT	SHAFTER	P	1917	B				051674	HIST.SURV.	3263-0002-0000	01/01/82	1S	
288 EUCLID	RESIDENCE	SHAFTER	U		B				065166	PROJ.REVW.	HUD870417A	04/23/87	6Y	
149 GOLDEN WEST		SHAFTER	U	1932	B			0	075100	PROJ.REVW.	HUD920218C	03/19/92	6Y2	
280 GOLDEN WEST AVE		SHAFTER	P	1935	B				098723	PROJ.REVW.	HUD951108I	12/12/95	6Y2	
530 JAMES ST	GREEN HOTEL / HITCHCOCK HOTEL / SHAFT	SHAFTER	P	1913	B		C		051676	HIST.SURV.	3263-0004-0000	03/16/89	1S	
										NAT.REG.	15-0001	03/16/89	1S	
										ST.FND.PRG	619.0-HP-88-15-003	12/19/88	3	
										HIST.RES.	SPHI-KER-009	11/28/86	7L	
										ST.FND.PRG	619.0-84-HP-15-004	10/08/86	3	
345 KERN ST	RESID REHAB	SHAFTER	U		B				066700	PROJ.REVW.	HUD880527E	06/21/88	6Y	
30714 MARTINEZ ST	RESIDENCE	SHAFTER	U		B				065198	PROJ.REVW.	HUD870518E	06/10/87	6Y	

P15-007591

PRIMARY RECORD

Primary #:

Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

P 15010224

Trinomial: CA-Ker-
HRI #:
NRHP Status Code:

Page _1_ of _2_ Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #1

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern

b. **Address:** W ½NE¼SE¼SW¼ section 11, Tnp. 9N., Rng. 13W, SBBM
City:
Zip:
Parcel #:

c. **UTM:** Zone 11: **mE/** **mN**
USGS Quad: Soledad Mtn.(1868) 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** W 1/2 NE 1/4 SE 1/4 SW 1/4 **Section** 11
Elevation: 2680

d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): small mining shaft 4 feet by 10 feet by est. 25-50 feet deep

Environmental Context for Isolates (P3a):
Nearest water: n/a
Vegetation: mixed crosote scrub
Landform: hill
Geology: Tertiary rhyolite breccia and porphory
Exposure/Slope: to north

P4. Resources Present: ____ Building ____ Structure ____ Object ____ Site ____ District ____ Element of District __X____Feature

P5. Photograph or drawing:

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BY:__________

PRIMARY RECORD
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15 010224
Trinomial: CA-Ker-
HRI #:
NRHP Status Code:

Page _2_ of _2_ Review Code _____ Reviewer __________ Date

P6. Date Constructed/Age: ____ Prehistoric _X_ Historic ____ Both

P7. Owner and Address: US Govt. (Managed by BLM, Rigdecrest Field Office)

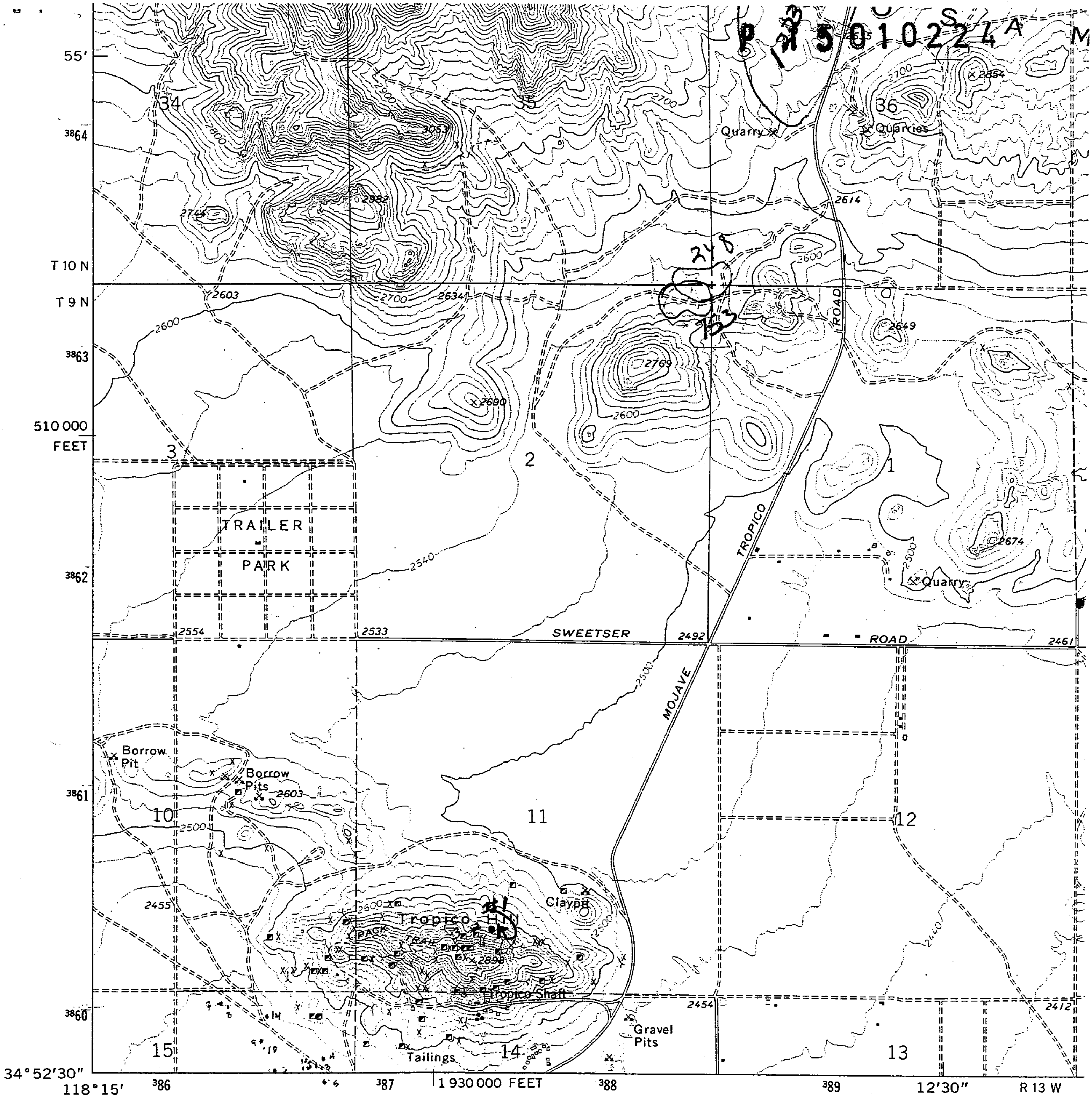
P8. Recorded by: Sarah Cunkelman, BLM, Barstow Field Office
Project #: Acton Exchange, Phase I

P9. Date recorded: May 22 2001

P10. Type of Survey: _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
_√_ Location Map (7.5' USGS quadrangle)
____ Building, Structure, and Object Record
____ Linear Resource Record
____ District Record
____ Illustration Sheet
____ Photograph Record
___ Archaeological Site Record



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

Supersedes Army Map Service map dated 1947

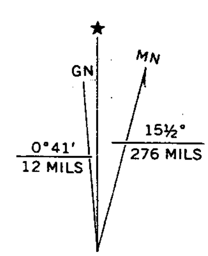
Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)

1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area

Vertical control based on latest available adjustment

(TLE BUTTES)
2353 IV SE



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15010225
Trinomial: CA-Ker-
HRI #:
NRHP Status Code:

Page 1 of 2 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #2

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:** NA
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: mE/ mN
USGS Quad: Soledad Mtn (1868) 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** SE 1/4 NW 1/4 SE 1/4 SW 1/4 **Section** 11
Elevation: 2730'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): small mining shaft measuring 4 feet by 6 feet by approximately 20 feet in tan to pink felsite

Environmental Context for Isolates (P3a):
Nearest water:
Vegetation: Mixed crosote bush scrub
Landform: hill
Geology: tertiary rhyolite porphory and breccia, felsite
Exposure/Slope: up, tailings to north

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JUN 11 2001
BY:_______

P4. Resources Present: ____ Building ____ Structure ____ Object ____ Site __X__ Feature ____ District ____ Element of District

P5.

PRIMARY RECORD - continued

P 15010225

Barstow Resource Area

Primary #:
Trinomial: CA-Ker-
HRI #:
Resource Identifier: Tropico #2

P6. Date Constructed/Age: ____ Prehistoric _X_ Historic ____ Both

P7. Owner and Address: US Govt. (Managed by BLM, Rigdecrest Field Office)

P8. Recorded by: Sarah C. Cunkelman, BLM, Barstow Field Office
Project #: Acton exchange, phase I

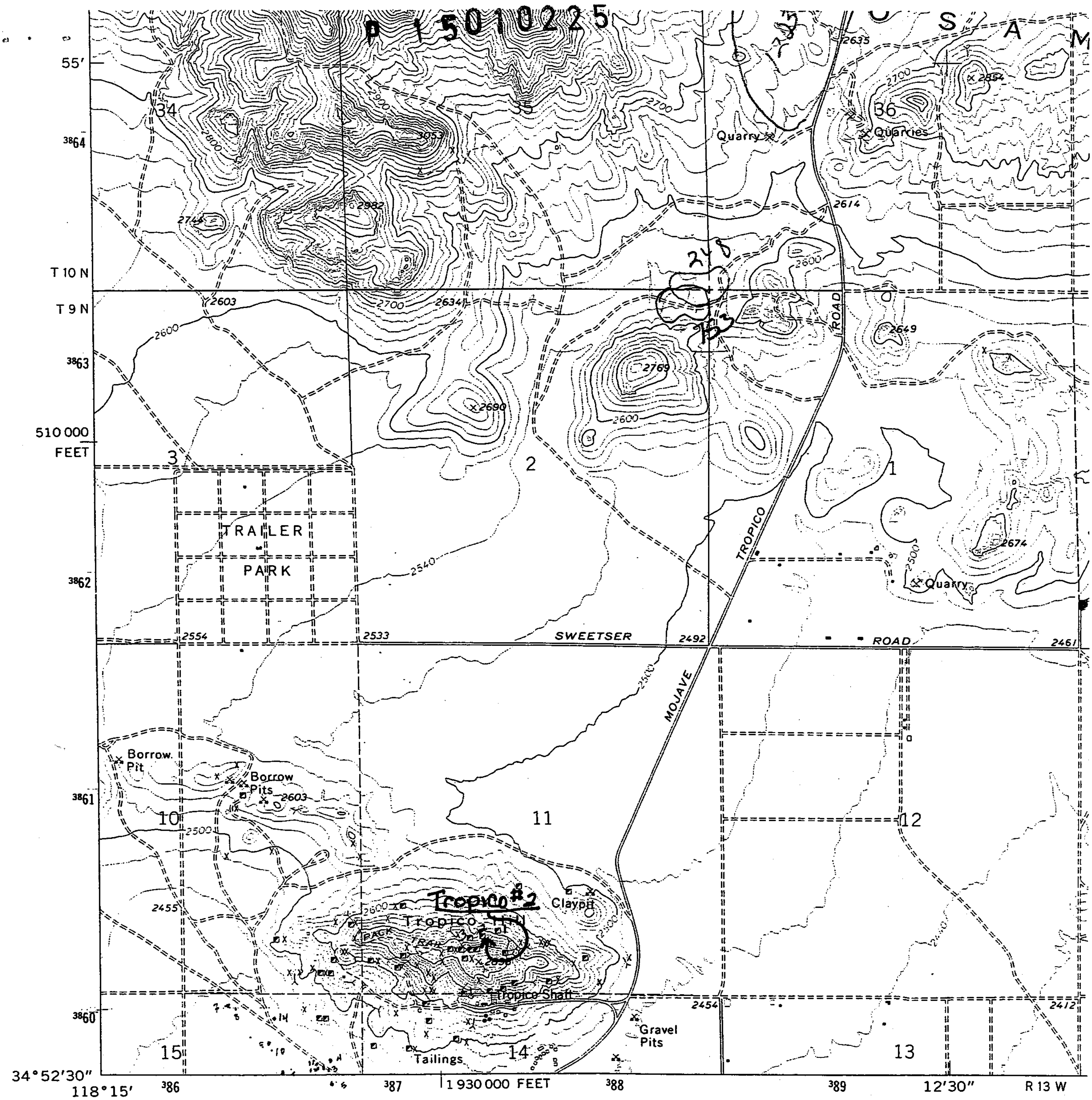
P9. Date recorded: 22 May 2001

P10. Type of Survey: _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- ___ Archaeological Site Record
- ___ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

Ph



(LITTLE BUTTES)
2353 IV SE

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

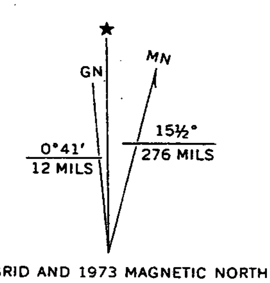
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)

1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area

Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD
Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

P 15010226

Primary #:
Trinomial: CA-Ker-
HRI #:
NRHP Status Code:

Page _1_ of _2_ Review Code _____ Reviewer __________ Date

P1. **Resource Identifier:** Tropico #3

P2. **Location** (Address and/or UTM coordinates. Attach location map as required).
- a. **County:** Kern
- b. **Address:** NA
  City:
  Zip:
  Parcel #:
- c. **UTM:** Zone 11: **mE/** , **mN**
  USGS Quad: Soledad Mtn (1860B) 7.5' **dated** 1973 **photorevised**
  Twp 9N **Rng** 13W **SBBM** SW 1/4 NW 1/4 SE 1/4 SW 1/4 **Section** 11
  Elevation: 2730'
- d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. **Description** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): mining adit measuring 4 feet wide by 5 feet and an estimated length of 100 feet (shown as a shaft on the topographic map) It follows a breccia and shear zone dipping 63 degrees southwest.

Environmental Context for Isolates (P3a):
Nearest water:
Vegetation: Mixed crosote bush scrub
Landform: hill
Geology: tertiary rhyolite porphory and breccia,
Exposure/Slope: adit is trending north 65 degrees west

P4. **Resources Present:** ____ Building ____ Structure ____ Object ____ Site __X__ Feature ____ District ____ Element of District

P5. **Photograph or Drawing** (Required for HRI buildings, structures, objects [see box next page].):

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BY:________

PRIMARY RECORD - continued

P 1 5010226

Barstow Resource Area

Primary #:
Trinomial: CA-Ker-
HRI #:
Resource Identifier: Tropico #3

P6. **Date Constructed/Age:** ____ Prehistoric __X__ Historic ____ Both

P7. **Owner and Address:** US Govt. (Managed by BLM, Rigdecrest Field Office)

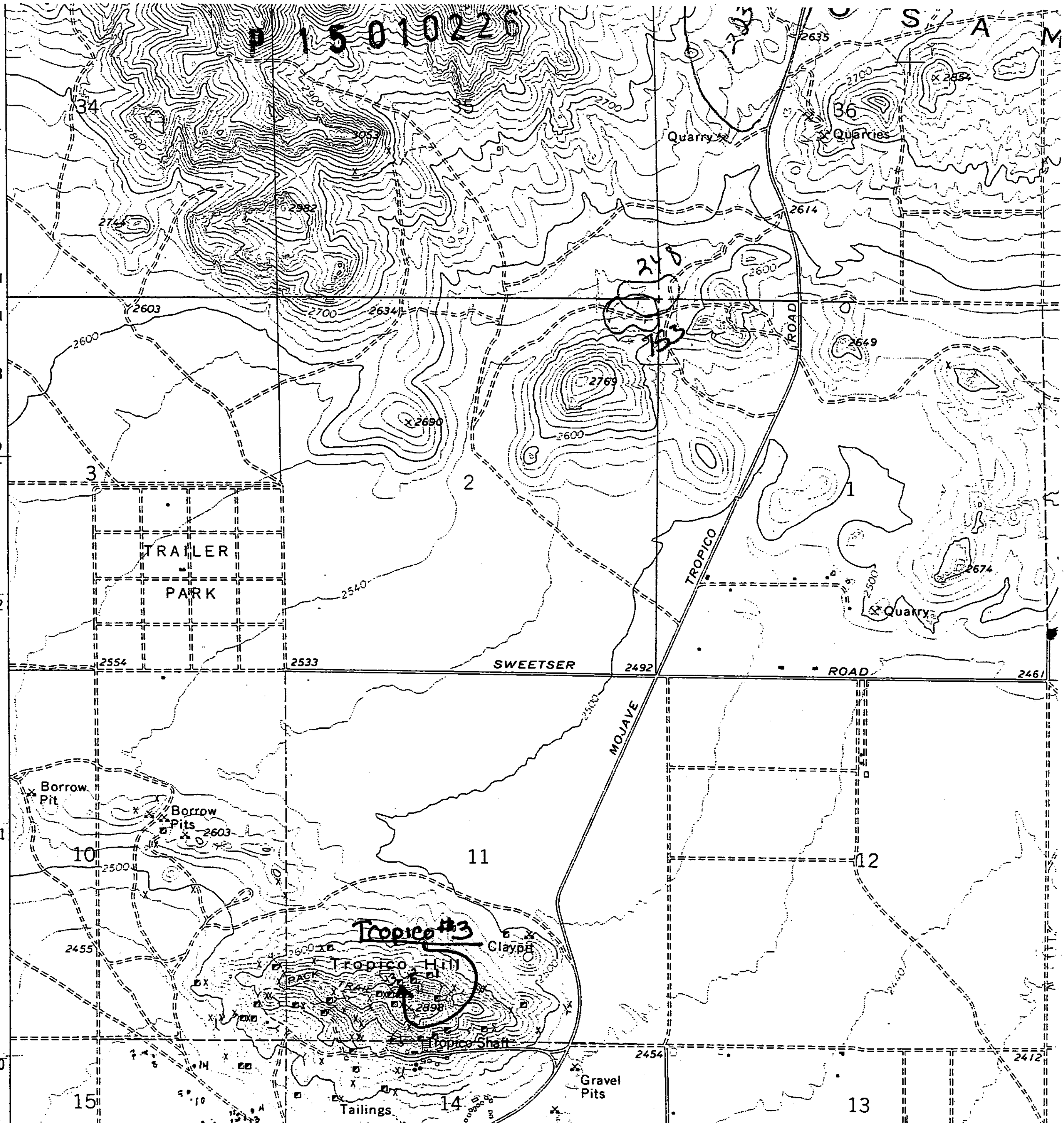
P8. **Recorded by:** Sarah C. Cunkelman, BLM, Barstow Field Office
Project #: Acton exchange, phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. **Report citation** (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
_√_ Location Map (7.5' USGS quadrangle)
____ Building, Structure, and Object Record
____ Linear Resource Record
____ District Record
____ Illustration Sheet
____ Photograph Record
____ Archaeological Site Recor
____ Archaeological Site Map
____ Archaeological Feature Re
____ Milling Station Record
____ Rock Art Record
____ Artifact Record
____ Other (list):



Mapped, edited, and published by the Geological Survey

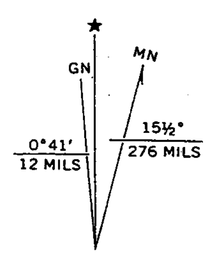
Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment

(TLE BUTTES)
2353 IV SE



UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

P 15010227

Primary #:
Trinomial: CA-Ker- 6003
HRI #:
NRHP Status Code:

Page _1_ of _4_ Review Code _____ Reviewer __________ Date

P1. **Resource Identifier:** Tropico #4

P2. **Location** (Address and/or UTM coordinates. Attach location map as required).
- a. **County:** Kern
- b. **Address:**
  City:
  Zip:
  Parcel #:
- c. **UTM:** Zone 11: 386778 **mE/** 3859742 **mN**
  USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
  Twp 9N **Rng** 13W **SBBM** NW 1/4 SE 1/4 NE 1/4 NE 1/4 **Section** 15
  Elevation: 2440'
- d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. **Description** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #4 is approximately 10' by 20' and contains baling wire, a portion of a stove pipe, broken brown bottles, chicken wire, barbed wire, a clear glass jar, a bucket and 28 tin cans including several evaporated milk tins, vegetable tins and 1 pound coffee tins. The milk tins measured 3 14/16' in height and 2 15/16 in width with 'matchstick' fill hole. Don Simonis' 'Milk can typology' indicates the milk tins were manufactured between 1917-1929. The sanitary vegetable tins lend credence to these dates. Most likely it was deposited in the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

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BY:________

P4. **Resources Present:** ____ Building ____ Structure ____ Object _X_ Site ____ District ____ Element of District

P5. **Photograph or Drawing** (Required for HRI buildings, structures, objects [see box next page].):

P6. **Date Constructed/Age:** ____ Prehistoric _X_ Historic ____ Both

P7. **Owner and Address:** US Government (managed by Ridgecrest Field Office of BLM)

P8. **Recorded by:** Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P 15010227

Trinomial: CA-~~SBr~~-KER-6003
HRI #:
Resource Identifier: Tropico #4

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:

- √ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- √ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

Ph

P 15010227

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA- KER-6003

A1. Resource Identifier: Tropico #4

A2. Resource Attributes (List attributes and codes.): historic period debris scatter

A3. Dimensions: Length x Width 10 feet by 20 feet

Method of measurement: ____ Paced ____ Taped _X_ Visual estimate ____ Other:

Method of determination (Check any that apply.): _X_ Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ___ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: _X_ High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None _X_ Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible _X_ Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): baling wire, a portion of a stove pipe, broken brown bottles, chicken wire, barbed wire, a clear glass jar, a bucket and 28 tin cans including several evaporated milk tins, vegetable tins and 1 pound coffee tins. The milk tins measured 3 14/16' in height and 2 15/16 in width with 'matchstick' fill hole.

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): see above

A8. Were Specimens Collected? _X_ No ___ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good ____ Fair _X_ Poor (Describe disturbances): some 'bottle collecting" evident, disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2420'

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.): sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level

P 15010227

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA-Ker- 6003
Resource Identifier: Tropico #4

Other associations: within 1 mile of the Tropico gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ___ Prehistoric ___ Pre-Colonial (1500-1769) ___ Spanish/Mexican (1769-1848)
___ Early American (1848-1880) ___ Turn of Century (1880-1914) _X_ Early 20th Century (1914-1945) ___ Post WWII (1945+) ___ Undetermined

Factual or estimated dates of occupation (Explain)**:** Don Simonis' "Milk can typology" indicates this size of milk tins were manufactured between 1917-1929. The sanitary vegetable/ fruit tins lend credence to these dates. Most likely it was deposited in the 1930s.

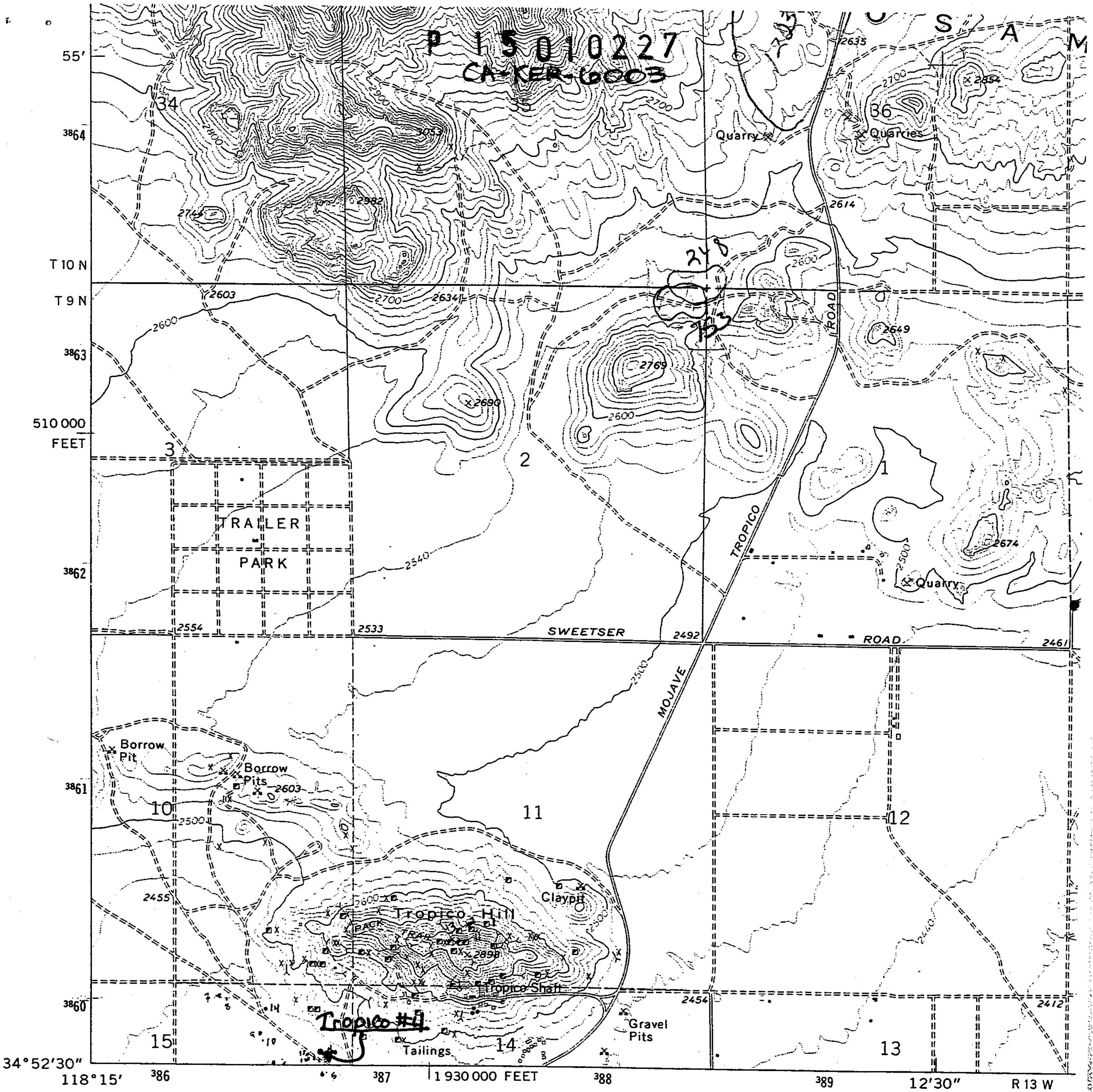
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



(...TLE BUTTES)
2353 IV SE

Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment

GN
MN
0°41'
12 MILS
15½°
276 MILS

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

1

FOR SALE

PRIMARY RECORD
Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

P 15010228

Primary #:
Trinomial: CA-Ker-6004
HRI #:
NRHP Status Code:

Page 1 of 4 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #5

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386796 **mE/** 3859669 **mN**
USGS Quad: Rosamond 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** NW 1/4 NE 1/4 SE 1/4 NE 1/4 **Section** 15
Elevation: 2420'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #5 is a historic debris scatter of an estimated 100 artifacts that is very widely dispersed with one concentration of 52 tin cans, identified as locus 1. Locus 1, measuring 4' by 4' contains sanitary tins for meat, fruits/vegetables, tobacco, coffee, baking soda, 2 broken Purex bottles and evaporated milk tins (3 14/16 by 2 15/16) that were manufactured between 1917-1929 (Simonis.) The remainder of the site is widely dispersed in a moon shape to the southwest of locus 1 and measures an estimated 40' by 15'. An additional 50+ artifacts were identified including wooden laths, amethyst glass, a circa 30's enameled dish tub, cocoa, meat vegetable/fruit and evaporated milk tins. The milk tins include the same size noted above and the smaller 2 7/16 high by 2 8/16 wide identified by Simonis as manufactured 1920-1930. The site most likely dates to the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object __X__ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

PRIMARY RECORD - continued

Barstow Resource Area

Primary #: P 15010228
Trinomial: CA-Ker-6004
HRI #:

Page 2 of 2
Resource Identifier: Tropico #5

P6. **Date Constructed/Age:** ____ Prehistoric _X_ Historic ____ Both

P7. **Owner and Address:** US Government (managed by Ridgecrest Field Office of BLM)

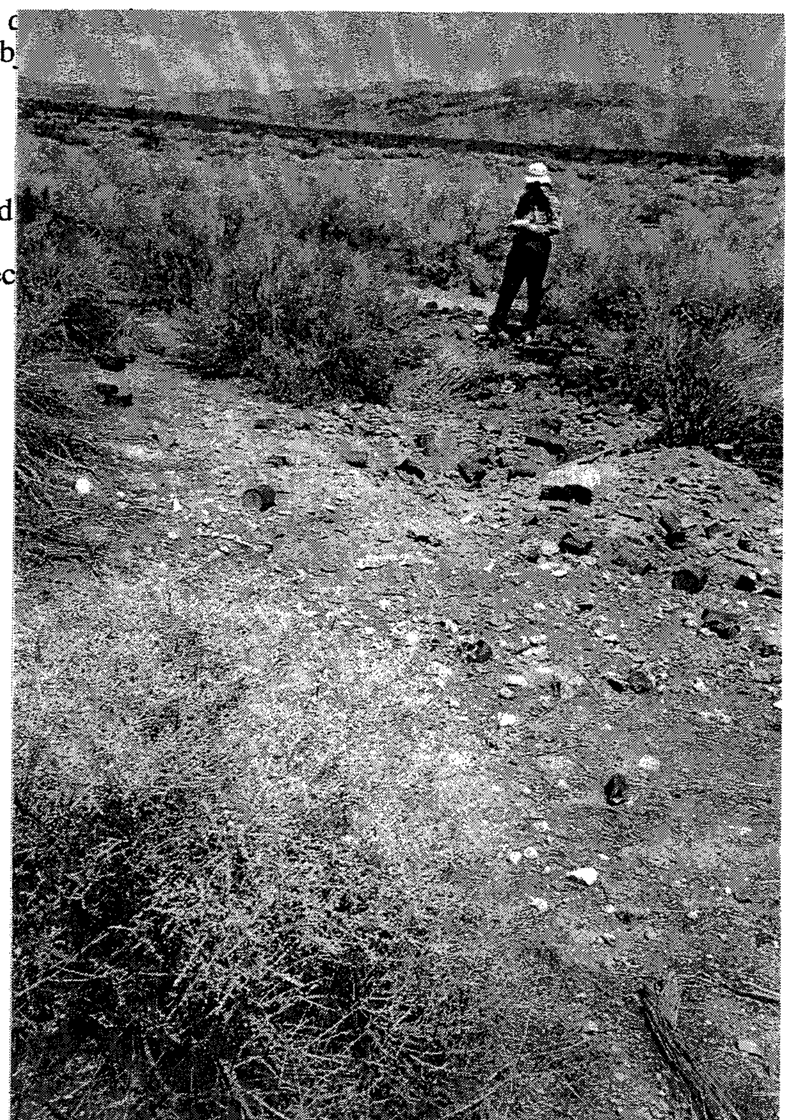
P8. **Recorded by:** Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. **Report citation** (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS c
- ____ Building, Structure, and Ob
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Rec
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):



ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker-6004

A1. Resource Identifier: Tropico #5

A2. Resource Attributes (List attributes and codes.): historic period debris scatter

A3. Dimensions: Length x Width 60' by 15'

Method of measurement: ____ Paced ____ Taped X Visual estimate ____ Other:

Method of determination (Check any that apply.): X Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: X High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None X Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible X Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): historic debris scatter of an estimated 100 artifacts that is very widely dispersed with one concentration of 52 tin cans, identified as locus 1. Locus 1, measuring 4' by 4' contains sanitary tins for meat, fruits/vegetables, tobacco, coffee, baking soda, 2 broken Purex bottles and evaporated milk tins (3 14/16" by 2 15/16") that were manufactured between 1917-1929 (Simonis.) The remainder of the site is widely dispersed in a moon shape to the southwest of locus 1 and measures an estimated 40' by 15'. An additional 50+ artifacts were identified including wooden laths, amethyst glass, a circa 30's enameled dish tub, cocoa, meat vegetable/fruit and evaporated milk tins.

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): see above

A8. Were Specimens Collected? X No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good ____ Fair X Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2420'

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848) ____ Early American (1848-1880) ____ Turn of Century (1880-1914) _X_ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** The milk tins include the same size noted above and the smaller 2 7/16" high by 2 8/16" wide identified by Simonis as manufactured 1920-1930. The site most likely dates to the 1930s. Don Simonis' "Milk can typology" indicates the larger size of milk tins was manufactured between 1917-1929. The sanitary vegetable/ fruit tins and other temporally diagnostic artifacts lend credence to these dates. Most likely it was deposited in the 1930s.

A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

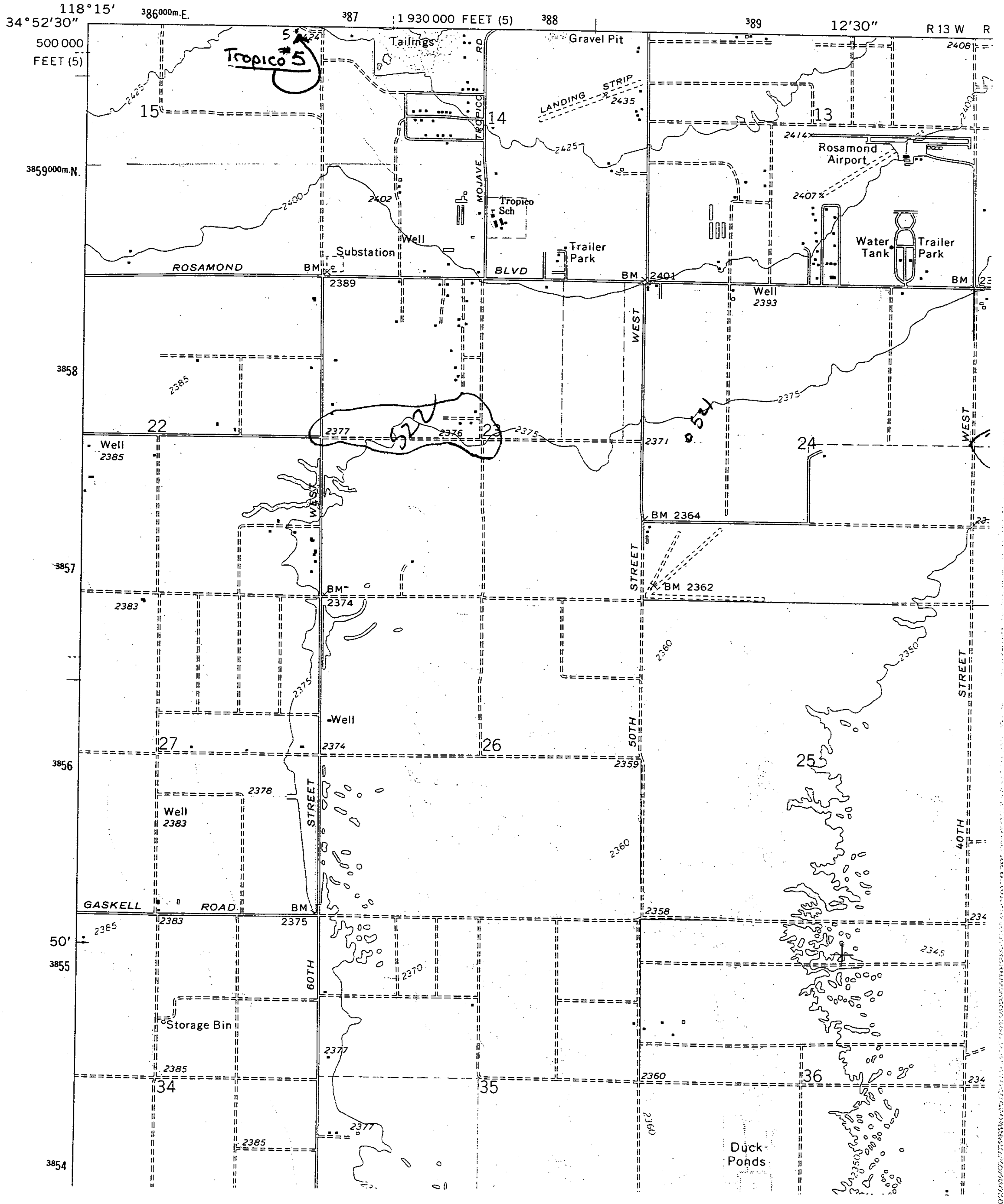
Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311

2853 IV NE
(W SPRINGS)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P 15010228

CA-KER-6004



PRIMARY RECORD
Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15 010229
Trinomial: CA-Ker-6005
HRI #:
NRHP Status Code:

 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #6

P2. Location (Address and/or UTM coordinates. Attach location map as required).
a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386555 **mE/** 3859700 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** SW 1/4 SW 1/4 NE 1/4 NE 1/4 **Section** 15
Elevation: 2420'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #6 is composed of 2 concentrations. Locus 1 contains 92 artifacts including sanitary cocoa tins, vegetable/fruit tins, beer cans with church-key openings, sardine tines, a battery, and milk tins from 1914-1929 (Simonis.) There are 3 tins (same types) between the 2 loci. Locus 2, located approximately 25' from the edge of locus 1 has an additional 94 artifacts including chicken wire, beer tins, sardine tins, milk tins, broken china (no maker marks), talc powder tin, assorted sanitary food tins and one piece of burnt bone with a butcher cut end, most likely beef. Locus 2 is an estimated 20' by 50' and Locus 1is 30' by 30'. The site appears to date to the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object __X__ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

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JUN 11 2001
BY:__________

PRIMARY RECORD - continued

P 15 010229

Barstow Resource Area

Page 2 of 4

Primary #:
Trinomial: CA-~~SBF~~ KER 6005
HRI #:
Resource Identifier: Tropico #6

P6. Date Constructed/Age: ____ Prehistoric _X_ Historic ____ Both

P7. Owner and Address: US Government (managed by Ridgecrest Field Office of BLM)

P8. Recorded by: Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. Date recorded: 22 May 2001

P10. Type of Survey: _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

Þ h

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker-6005

A1. Resource Identifier: Tropico #6

A2. Resource Attributes (List attributes and codes.)**:** historic period debris scatter

A3. Dimensions: Length x Width 100' X 30'

Method of measurement: ____ Paced ____ Taped X Visual estimate ____ Other:

Method of determination (Check any that apply.): X Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: X High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None X Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible X Unknown (Explain):extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.)**:** 2 loci with historic period debris: Locus 1 (30' X 30') contains 92 artifacts including sanitary cocoa tins, vegetable/fruit tins, beer cans with church-key openings, sardine tines, a battery, and milk tins from 1914-1929 (Simonis.) There are 3 tins (same types) between the 2 loci. Locus 2, located approximately 25' from the edge of locus 1 has an additional 94 artifacts including chicken wire, beer tins, sardine tins, milk tins, broken china (no maker marks), talc powder tin, assorted sanitary food tins and one piece of burnt bone with a butcher cut end, most likely beef. Locus 2 is an estimated 20' by 50'. The site appears to date to the 1930s.

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): see above

A8. Were Specimens Collected? X No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good X Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2420'

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA-Ker 6005
Resource Identifier: Tropico #6

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848)
____ Early American (1848-1880) ____ Turn of Century (1880-1914) __X__ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** The milk tins include the same size noted above which date to 1917-1929 according to Don Simonis' "Milk can typology". Church key openings in beer cans indicate 1935 or later.

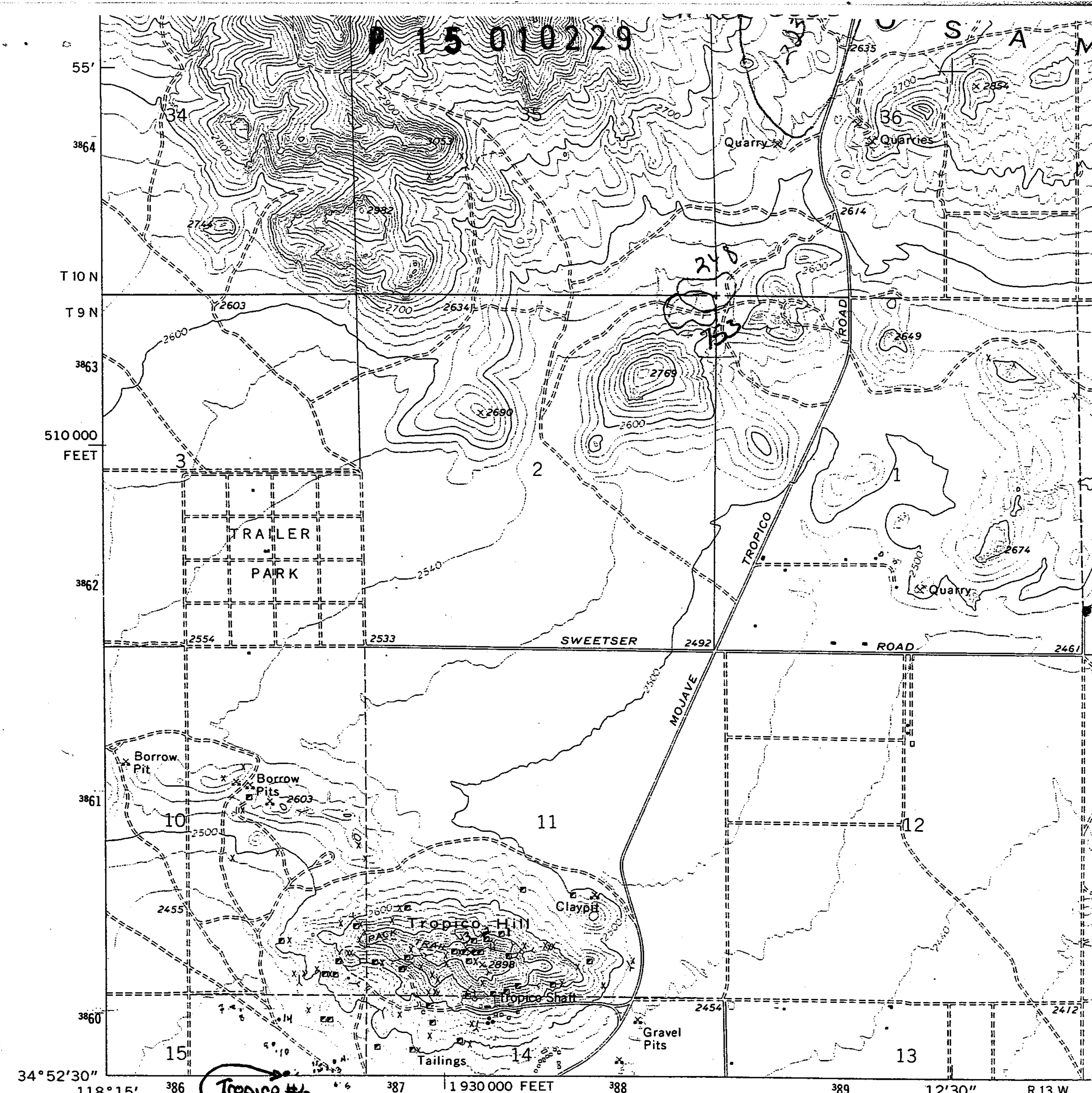
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



TTLE BUTTES)
2353 IV SE

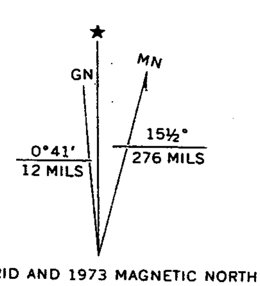
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

FOR SALE

P 15010230

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #:
Trinomial: CA-Ker- 6006
HRI #:
NRHP Status Code:

 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #7

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386301 **mE/** 3860044 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** NW 1/4 NE 1/4 NE 1/4 NW 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #7 is a very dispersed scatter of 21 tins in an circular area with a 50' radius. Artifacts include large log cabin syrup, 3 coffee tins, a spice tin (pepper?), 2 sardine tins, a bucket, beer cans with church key opening and sanitary vegetable/fruit tins. Log cabin syrup originated in 1888 and was almost immediately followed by the log cabin shaped tin but the large, 'family' size was not produced until 1927 (Rock 1978.) The site was most likely created in the 1930s with the tins dispersed over time by wind, water and sheep.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object __X__ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

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JUN 11 2001
BY:

P6. Date Constructed/Age: ____ Prehistoric X Historic ____ Both

P7. Owner and Address: US Government (managed by Ridgecrest Field Office of BLM)

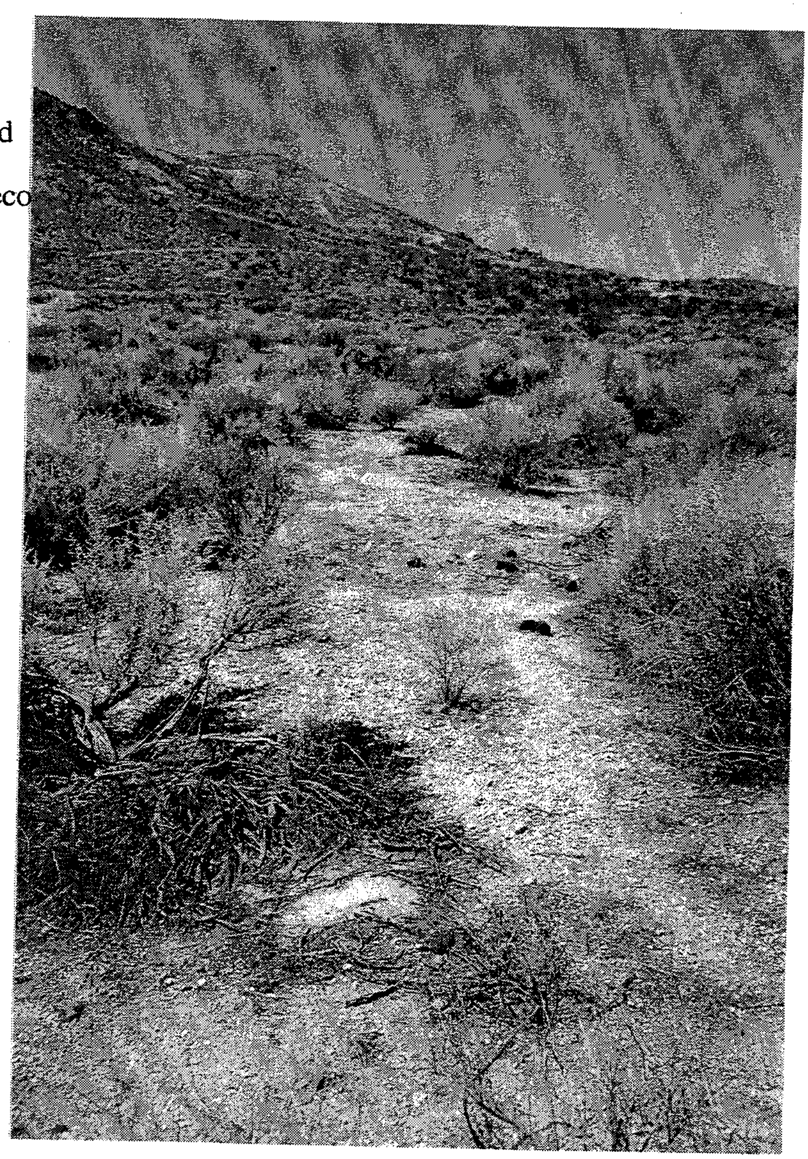
P8. Recorded by: Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. Date recorded: 22 May 2001

P10. Type of Survey: X Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- √ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- √ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Reco
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):



P 15010230

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6006

A1. Resource Identifier: Tropico #7

A2. Resource Attributes (List attributes and codes.): historic period debris scatter

A3. Dimensions: Length x Width 100 feet diameter

Method of measurement: ____ Paced ____ Taped X Visual estimate ____ Other:

Method of determination (Check any that apply.): X Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: X High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None X Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible X Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): Tropico #7 is a very dispersed scatter of 21 tins in an circular area with a 50' radius. Artifacts include large log cabin syrup, 3 coffee tins, a spice tin (pepper?), 2 sardine tins, a bucket, beer cans with church key opening and sanitary vegetable/fruit tins. Log cabin syrup originated in 1888 and was almost immediately followed by the log cabin shaped tin but the large, 'family' size was not produced until 1927 (Rock 1978.) The site was most likely created in the 1930s with the tins dispersed over time by wind, water and sheep.

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): see above

A8. Were Specimens Collected? X No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good X Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2420'

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued

BLM, Barstow Field Office

Trinomial: CA-Ker-6006
Resource Identifier: Tropico #7

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848) ____ Early American (1848-1880) ____ Turn of Century (1880-1914) __X__ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** Church key openings in beer cans indicate 1935 or later. Large log cabin dates to 1927 or later.

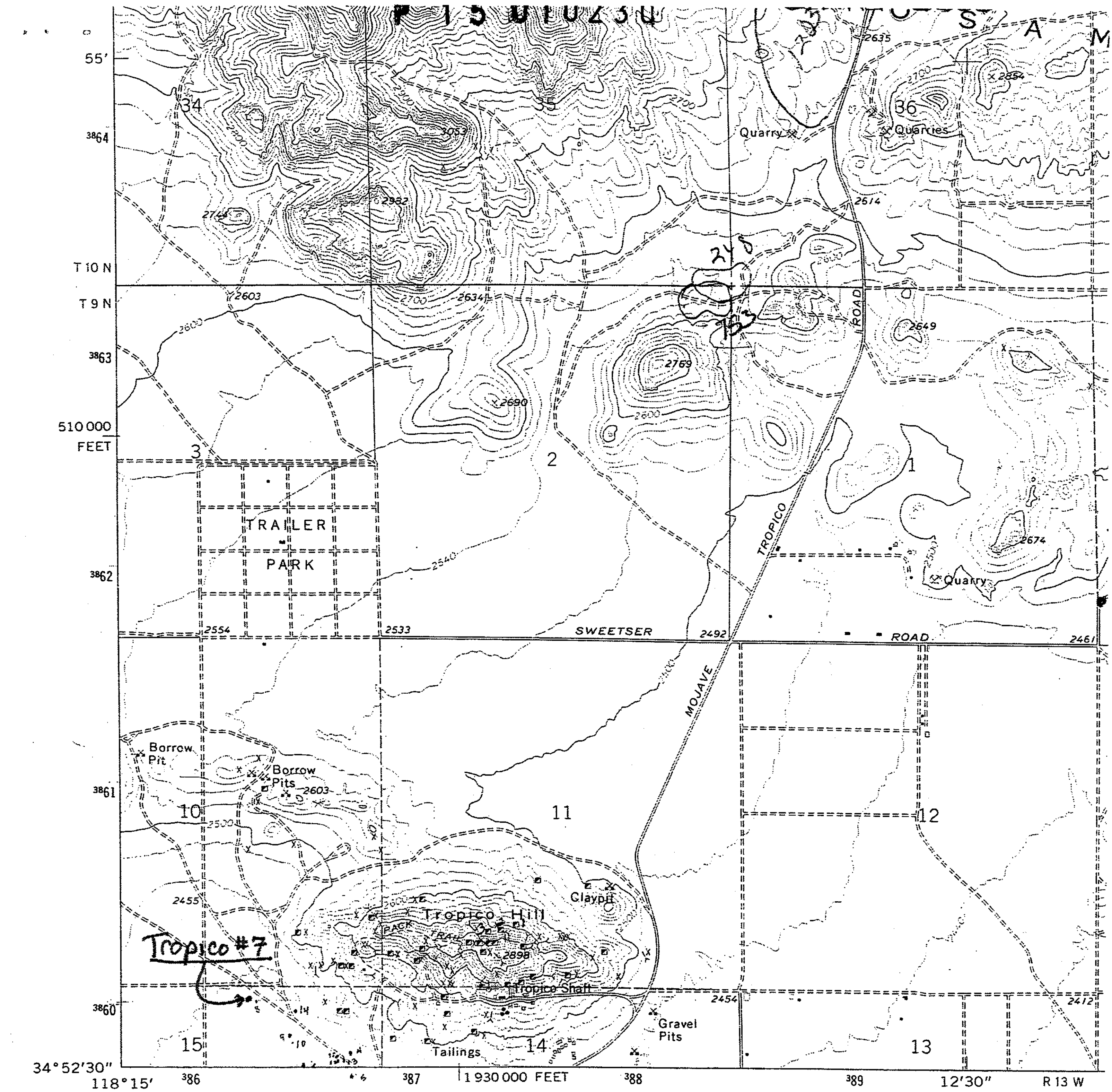
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



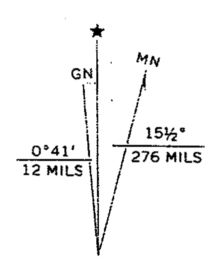
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

P 15010231

Primary #:
Trinomial: CA-Ker-6007
HRI #:
NRHP Status Code:

Page 1 of 4 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #8

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386342 **mE/** 3860016 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** NW 1/4 NE 1/4 NE 1/4 NW 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.):Tropico #8 is a small can scatter with beer cans with church key openings (1935 or later), 1 pound coffee tins, peanut butter pail (possibly the small salted peanuts pail), sardine tins (key roll-top opening) and milk tins measuring 2 6/16" by 2 8/16" and 3 14/16" by 2 15/16" (1917-1930 after Simonis.) Site is 10' by 10' and appears to date to the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object __X__ Site
____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

Primary #: P 15010231
Trinomial: CA-Ker- 6007
HRI #:
Resource Identifier: Tropico #8

P6. **Date Constructed/Age:** ____ Prehistoric _X_ Historic ____ Both

P7. **Owner and Address:** US Government (managed by Ridgecrest Field Office of BLM)

P8. **Recorded by:** Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. **Report citation** (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

5 h

P 15010231

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6007

A1. Resource Identifier: Tropico #8

A2. Resource Attributes (List attributes and codes.): historic period debris scatter

A3. Dimensions: Length x Width 10' by 10'

Method of measurement: ____ Paced ____ Taped _X_ Visual estimate ____ Other:

Method of determination (Check any that apply.): _X_ Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: _X_ High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None _X_ Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible _X_ Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): **debris scatter, see below**

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): Tropico #8 is a small can scatter with beer cans with church key openings (1935 or later), 1 pound coffee tins, peanut butter pail(possibly the small salted peanuts pail), sardine tins (key roll-top opening) and milk tins measuring 2 6/16" by 2 8/16" and 3 14/16" by 2 15/16" (1917-1930 after Simonis.) Site is 10' by 10' and appears to date to the 1930s.

A8. Were Specimens Collected? _X_ No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good _X_ Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2420'

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA-Ker- 6007
Resource Identifier: Tropico #8

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848)
____ Early American (1848-1880) ____ Turn of Century (1880-1914) _X_ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** Church key openings in beer cans indicate 1935 or later. Milk can typology developed by Simonis indicates these milk cans were manufactured 1917-1930.

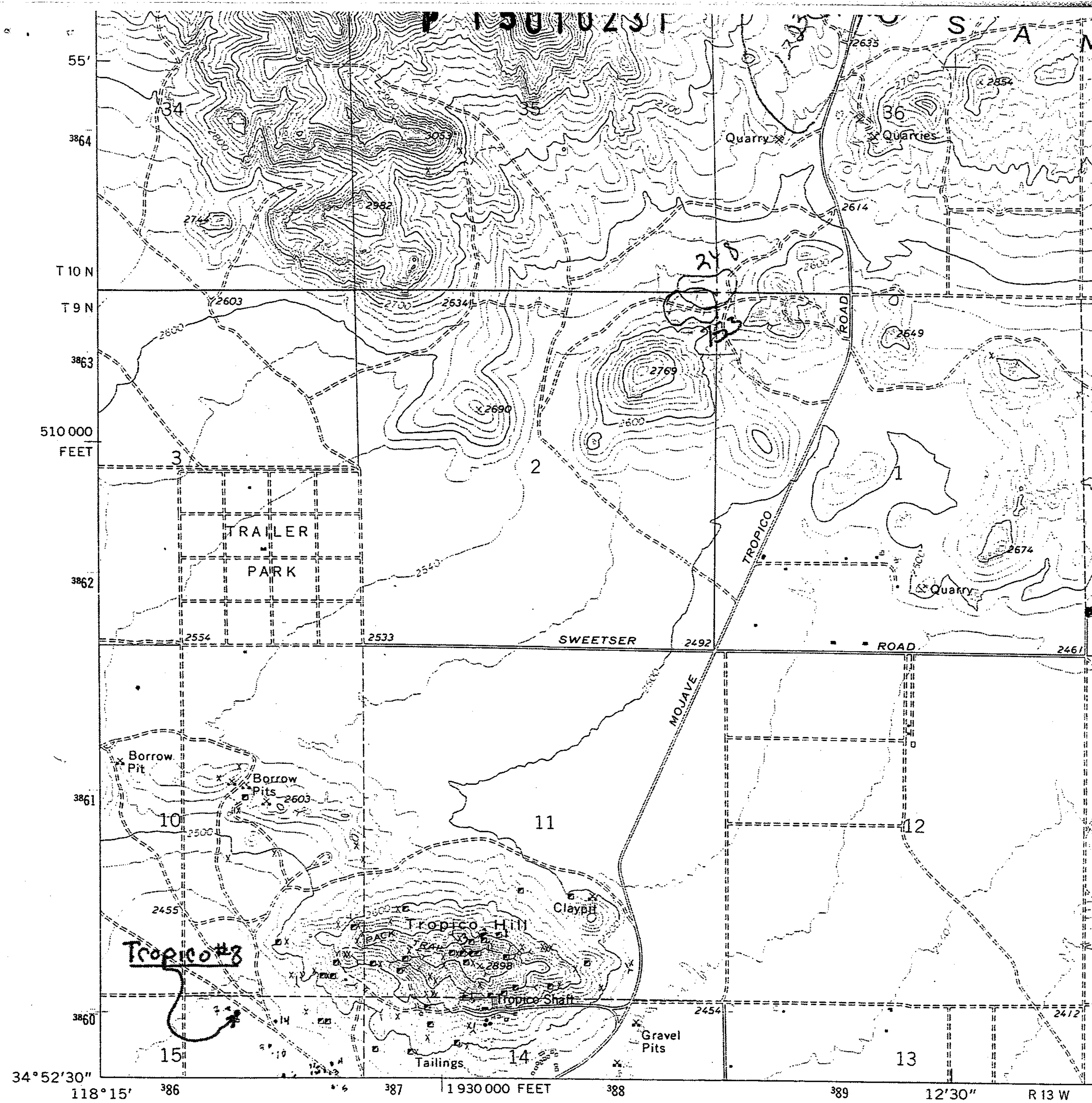
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

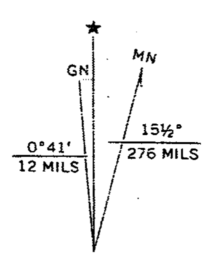
Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area

Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15010232
Trinomial: CA-Ker-6008
HRI #:
NRHP Status Code:

 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #9

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386496 **mE/** 3859859 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** NE 1/4 SE 1/4 NW 1/4 NE 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #9 contains 3 loci approximately thirty feet north/south and 25 feet east/west separating loci 1 and 2. Locus 3 is twenty food tins widely distributed 50 feet south of 1 and 2. Locus 1 (farthest west) contains 610 artifacts including lantern parts, an intact brown medicine bottle, several broken Fiesta ware shards, Ponds cold, cream numerous sanitary tins such as vegetable/fruit, beer with church-key openings, coffee, peanut butter pail, kippers, sardines and milk tins (from 1917-1929, Simonis.) The Fiesta ware is the original red, yellow, cobalt blue and light green first manufactured by Homer Laughlin in 1936 and available until 1943 (red) or 1951. Locus 1 measures 20' by 40 feet. The site appears to date to the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object __X__ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

RECEIVED
JUN 11 2001
BY:__________

Primary #: P 15010232
Trinomial: CA-Ker- 6008
HRI #:
Resource Identifier: Tropico #9

P6. **Date Constructed/Age:** ____ Prehistoric _X_ Historic ____ Both

P7. **Owner and Address:** US Government (managed by Ridgecrest Field Office of BLM)

P8. **Recorded by:** Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. **Report citation** (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

P 15010232

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker 6008

A1. Resource Identifier: Tropico #9

A2. Resource Attributes (List attributes and codes.)**:** historic period debris scatter

A3. Dimensions: Length x Width 100' by 60'

Method of measurement: ____ Paced ____ Taped _X_ Visual estimate ____ Other:

Method of determination (Check any that apply.): _X_ Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: _X_ High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None _X_ Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible _X_ Unknown (Explain):extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.)**:** debris scatter with 3 loci, see below

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): Tropico #9 contains 3 loci approximately thirty feet north/south and 25 feet east/west separating loci 1 and 2. Locus 3 is twenty food tins widely distributed 50 feet south of 1 and 2. Locus 1 (farthest west) contains 610 artifacts including lantern parts, an intact brown medicine bottle, several broken Fiesta ware shards, Ponds cold, cream numerous sanitary tins such as vegetable/fruit, beer with church-key openings, coffee, peanut butter pail, kippers, sardines and milk tins (from 1917-1929, Simonis.) The Fiesta ware is the original red, yellow, cobalt blue and light green first manufactured by Homer Laughlin in 1936 and available until 1943 (red) or 1951. Locus 1 measures 20' by 40 feet. The site appears to date to the 1930s.

A8. Were Specimens Collected? _X_ No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good _X_ Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2430'

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued

BLM, Barstow Field Office

Trinomial: CA-Ker-6008
Resource Identifier: Tropico #9

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848) ____ Early American (1848-1880) ____ Turn of Century (1880-1914) _X_ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** Church key openings in beer cans indicate 1935 or later. Milk can typology developed by Simonis indicates these mild cans were manufactured 1917-1930. Fiesta ware is type released in 1936.

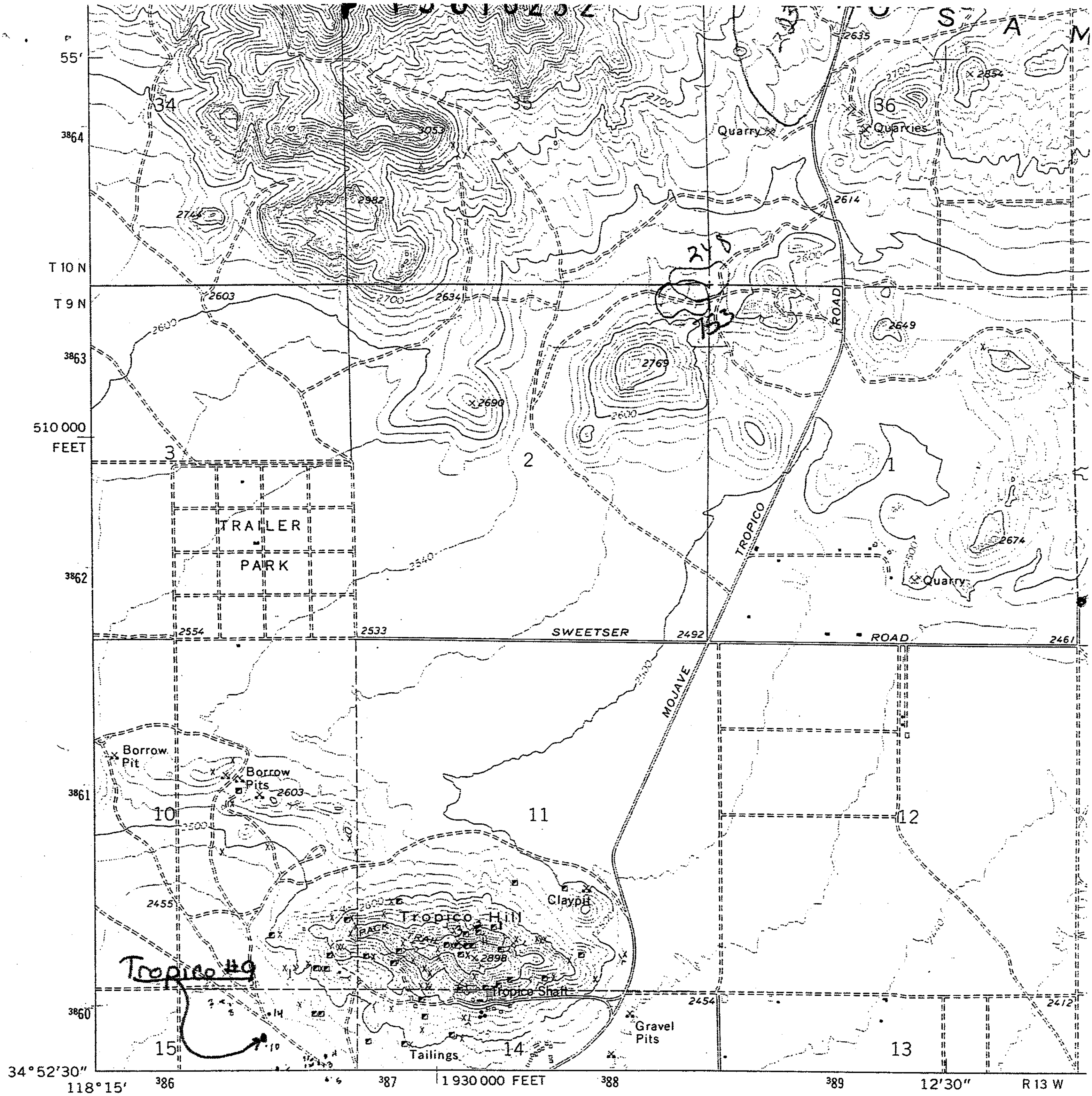
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

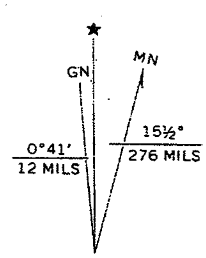
Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment

TLE BUTTES)
2353 IV SE



UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15010233
Trinomial: CA-Ker- 6009
HRI #:
NRHP Status Code:

Page 1 of 4 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #10

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386512 **mE/** 3859823 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** NE 1/4 SE 1/4 NW 1/4 NE 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #10 measures 20' by 30' and contains barrel bands (3), 1-pound coffee tins (2), a peanut butter 'pail', beer cans with church-key opening, lantern parts (2), kippers (3), large juice tin (tomato juice?), meat tins, Copenhagen tins (2) and evaporated milk tins (1917-1929, after Simonis.) The site is most likely from the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object __X__ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

Primary #: P 15 010233
Trinomial: CA-Ker- 6009
HRI #:
Resource Identifier: Tropico #10

P6. Date Constructed/Age: ____ Prehistoric _X_ Historic ____ Both

P7. Owner and Address: US Government (managed by Ridgecrest Field Office of BLM)

P8. Recorded by: Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. Date recorded: 22 May 2001

P10. Type of Survey: _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
_√_ Location Map (7.5' USGS quadrangle)
____ Building, Structure, and Object Record
____ Linear Resource Record
____ District Record
____ Illustration Sheet
____ Photograph Record
_√_ Archaeological Site Record
____ Archaeological Site Map
____ Archaeological Feature Record
____ Milling Station Record
____ Rock Art Record
____ Artifact Record
____ Other (list):

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ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6009

A1. Resource Identifier: Tropico #10

A2. Resource Attributes (List attributes and codes.)**:** historic period debris scatter

A3. Dimensions: Length x Width 20' by 30'

Method of measurement: ____ Paced ____ Taped X Visual estimate ____ Other:

Method of determination (Check any that apply.): X Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation

Reliability of determination: X High ____ Low Explain:
Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None X Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible X Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.)**:** debris scatter, see below

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): Tropico #10 measures 20' by 30' and contains barrel bands (3), 1-pound coffee tins (2), a peanut butter 'pail', beer cans with church-key opening, lantern parts (2), kippers (3), large juice tin (tomato juice?), meat tins, Copenhagen tins (2) and evaporated milk tins (1917-1929, after Simonis.) The site is most likely from the 1930s.

A8. Were Specimens Collected? X No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good X Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2430'

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA-Ker- 6009
Resource Identifier: Tropico #10

A13. Historical Information (Note sources and provide full citations below [A15].):

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848)
____ Early American (1848-1880) ____ Turn of Century (1880-1914) __X__ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain): Church key openings in beer cans indicate 1935 or later. Milk can typology developed by Simonis indicates these mild cans were manufactured 1917-1930.

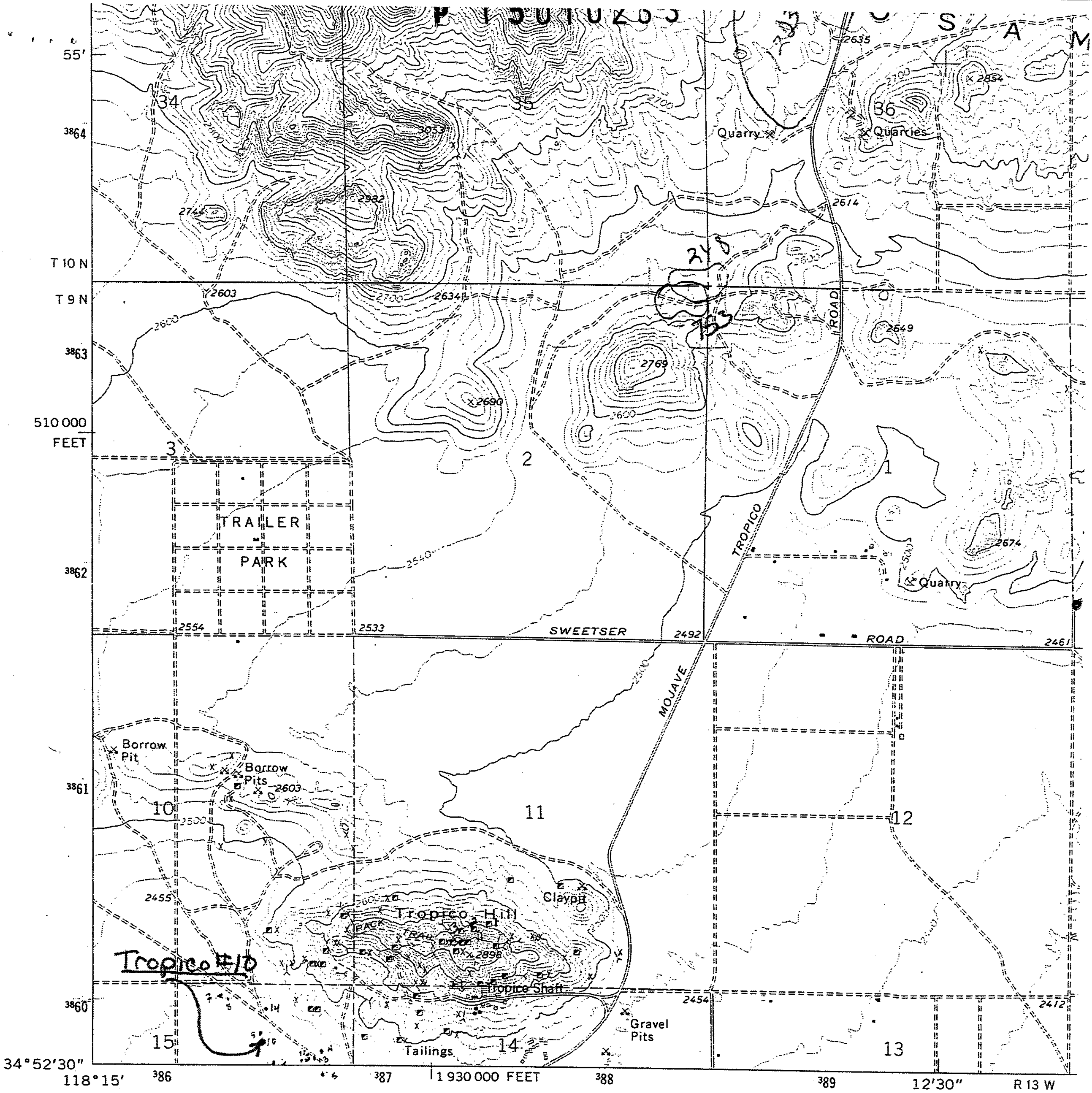
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.): not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.):

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.):

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



(TLE BUTTES)
2353 IV SE

Mapped, edited, and published by the Geological Survey

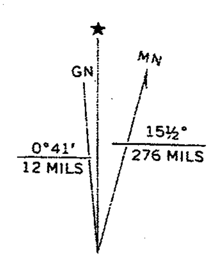
Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15010234
Trinomial: CA-Ker-6010
HRI #:
NRHP Status Code:

Page 1 of 4   Review Code ____   Reviewer ________   Date

P1. Resource Identifier: Tropico #11

P2. Location (Address and/or UTM coordinates. Attach location map as required).

a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386711 **mE/** 3859769 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** SE 1/4 SW 1/4 NE 1/4 NE 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): 7 tin cans : one 'matchstick' evaporated tin (1917-1929), three side-seam and end seams soldered 'hole in cap' vegetable tins measuring 4" by 4 3/4" with a 2 1/4" cap and three soldered milk tins with 'hole in cap' measuring 3 5/16 X 2 15/16 with 1 9/16 cap (circa 1885-1903, after Simonis.) The site is confined to an are 4' by 7'. All artifacts except the 'matchstick' milk tin date to the early part of the 20th Century.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object _X_ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

RECEIVED
JUN 11 2001
BY:________

Primary #: P 15 010234
Trinomial: CA-Ker- 6010
HRI #:
Resource Identifier: Tropico #11

P6. **Date Constructed/Age:** ____ Prehistoric _X_ Historic ____ Both

P7. **Owner and Address:** US Government (managed by Ridgecrest Field Office of BLM)

P8. **Recorded by:** Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. **Report citation** (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:

- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

P 15010234

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6010

A1. Resource Identifier: Tropico #11

A2. Resource Attributes (List attributes and codes.)**:** historic period debris scatter

A3. Dimensions: Length x Width 4' by 7'

Method of measurement: ____ Paced ____ Taped __X__ Visual estimate ____ Other:

Method of determination (Check any that apply.): __X__ Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: __X__ High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None __X__ Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible __X__ Unknown (Explain):extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.)**:** debris scatter, see below

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): 7 tins cans: one 'matchstick' evaporated tin (1917-1929), three 7 tins cans: one 'matchstick' evaporated tin (1917-1929), three side-seam and end seams soldered 'hole in cap' vegetable tins measuring 4" by 4 3/4" with a 2 1/4" cap and three soldered milk tins with 'hole in cap' measuring 3 5/16 X 2 15/16 with 1 9/16 cap (circa 1885-1903, after Simonis.) The site is confined to an are 4' by 7'. All artifacts except the 'matchstick' milk tin date to the early part of the 20th Century.

A8. Were Specimens Collected? __X__ No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good __X__ Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2430'

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA- 6010
Resource Identifier: Tropico #11

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848)
____ Early American (1848-1880) ____ Turn of Century (1880-1914) __X__ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** Milk can typology developed by Simonis indicates these milk cans were manufactured1885-1903. Side-seam and end seams soldered 'hole in cap' vegetable tins measuring 4" by 4 3/4" with a 2 1/4" cap and the three soldered milk tins with 'hole in cap' measuring 3 5/16" X 2 15/16" with 1 9/16" cap support a very early date in the 20th Century

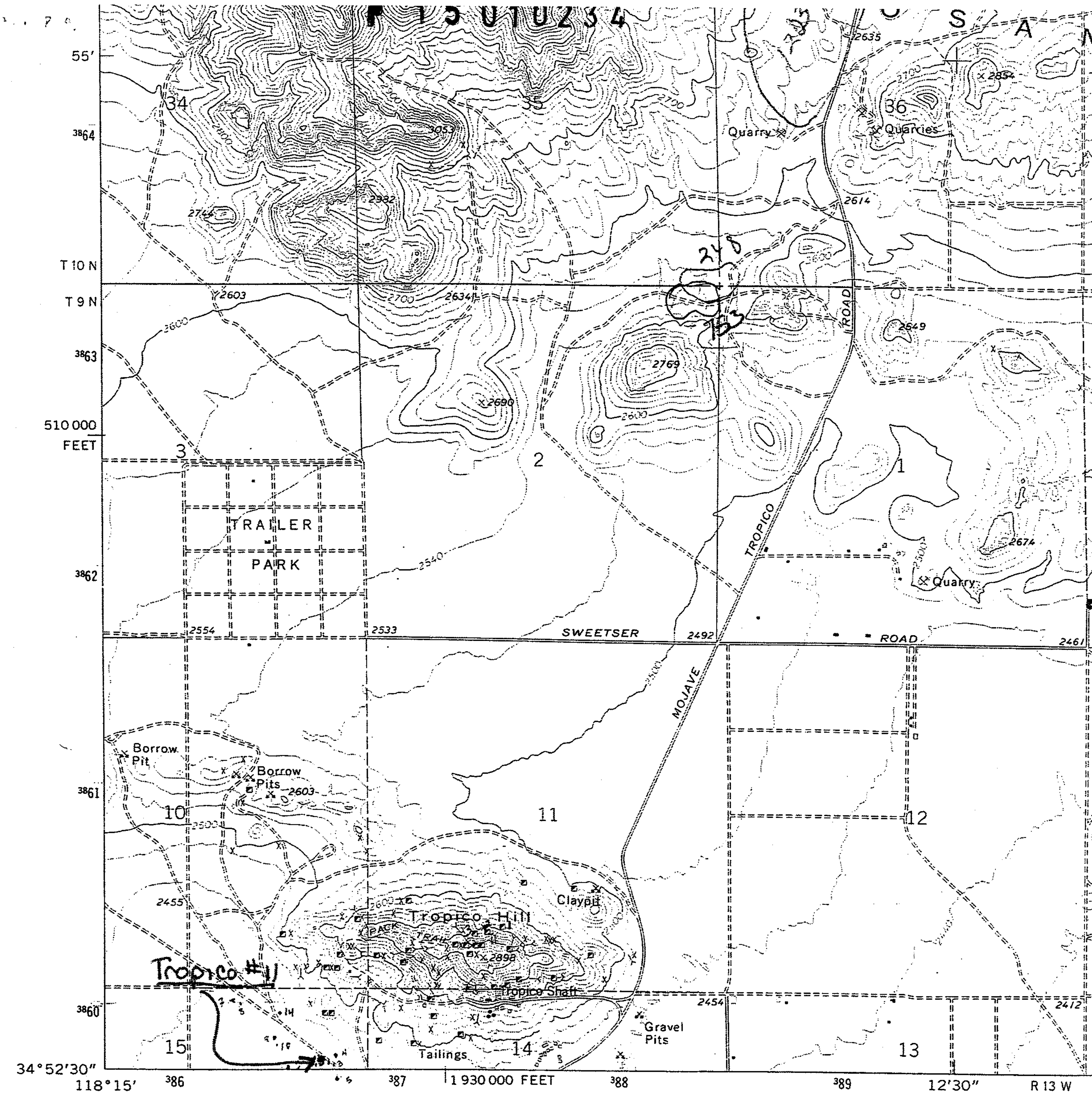
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



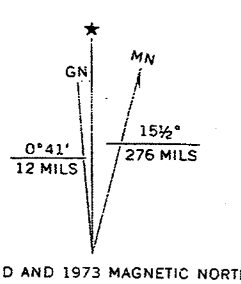
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

TTLE BUTTES)
2353 IV SE

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15010235
Trinomial: CA-Ker- 6011
HRI #:
NRHP Status Code:

Page 1 of 4 Review Code _____ Reviewer __________ Date

P1. **Resource Identifier:** Tropico #12

P2. **Location** (Address and/or UTM coordinates. Attach location map as required).
a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386702 **mE/** 3859755 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** SE 1/4 SW 1/4 NE 1/4 NE 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. **Description** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Topico #12 covers an area of 10' by 35'. Hole in cap vegetable/fruit tins with 2 3/4" cap and side seam and end seams solder, smaller vegetable/fruit tins with 1 3/4" cap with solder, one 'matchstick' milk tin 2 15/16" by 4 4/16" (circa 1915-1930), 'hole in cap' milk tins with side seam and end seam solder measuring 4 6/16" X 2 15/16" with 12/16" cap (circa 1908-1914) and 4 4/16" by 2 15/16" with 1 1/16" cap (1903-1914) comprise the assemblage of 35 tins.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. **Resources Present:** ____ Building ____ Structure ____ Object __X__ Site
____ District ____ Element of District

P5. **Photograph or Drawing** (Required for HRI buildings, structures, objects [see box preceeding page].):

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JUN 11 2001
BY:________

P 15010235

Barstow Resource Area

Primary #:
Trinomial: CA-Ker- 6011
HRI #:
Resource Identifier: Tropico #12

P6. **Date Constructed/Age:** ____ Prehistoric _X_ Historic ____ Both

P7. **Owner and Address:** US Government (managed by Ridgecrest Field Office of BLM)

P8. **Recorded by:** Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. **Date recorded:** 22 May 2001

P10. **Type of Survey:** _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. **Report citation** (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

Þ h

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6011

A1. Resource Identifier: Tropico #12

A2. Resource Attributes (List attributes and codes.): historic period debris scatter

A3. Dimensions: Length x Width 10' by 35'

Method of measurement: ____ Paced ____ Taped __X__ Visual estimate ____ Other:

Method of determination (Check any that apply.): __X__ Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: __X__ High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None __X__ Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible __X__ Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): debris scatter, see below

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): Hole in cap vegetable/fruit tins with 2 3/4" cap and side seam and end seams solder, smaller vegetable/fruit tins with 1 3/4" cap with solder, one 'matchstick' milk tin 2 15/16" by 4 4/16" (circa 1915-1930), 'hole in cap' milk tins with side seam and end seam solder measuring 4 6/16" X 2 15/16" with 12/16" cap (circa 1908-1914) and 4 4/16" by 2 15/16" with 1 1/16" cap (1903-1914) comprise the assemblage of 35 tins.

A8. Were Specimens Collected? __X__ No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good __X__ Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2430'

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.): sandy alluvium

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA-Ker- 6001
Resource Identifier: Tropico #12

A12. Environmental Setting (cont.):
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848)
____ Early American (1848-1880) ____ Turn of Century (1880-1914) _X_ Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain)**:** Milk can typology developed by Simonis indicates these milk cans were manufactured1903-1914 and 1908-1914. Side-seam and end seams soldered 'hole in cap' vegetable tins and the soldered milk tins with 'hole in cap' support an early date in the 20th Century

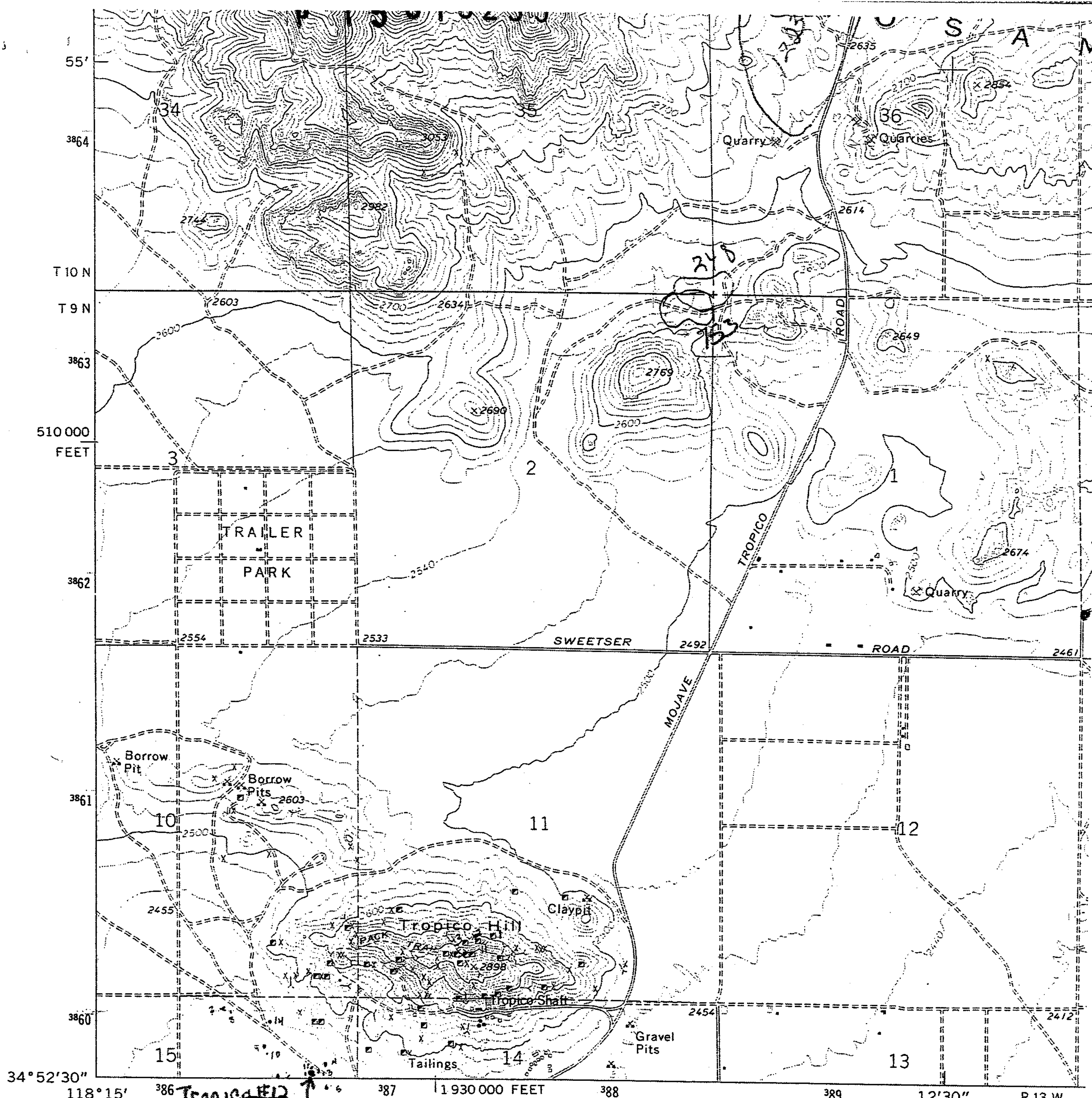
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



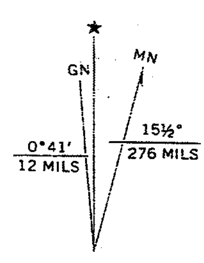
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD
Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

P 1 5010236

Primary #:
Trinomial: CA-Ker-6012
HRI #:
NRHP Status Code:

Page 1 of 4 Review Code _____ Reviewer __________ Date

P1. Resource Identifier: Tropico #13

P2. Location (Address and/or UTM coordinates. Attach location map as required).
a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386742 **mE/** 3859747 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** SW 1/4 SE 1/4 NE 1/4 NE 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. Description (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): Tropico #13 is a debris scatter with two concentrations over an area of an estimated 20' by 50' with 110 artifacts. Artifacts include beer with church key opening (1935 or later), key-strip meat tins, sardine tins, vegetable/fruit 'sanitary' tins, clear glass fragments, jar with a screw-top lid, crown caps, coffee tins (1 and 2 pound sizes), round meat tin with key strip (ham?), milk bottle top, hair tonic bottle, Lipton Tea tin (type manufactured starting in 1915 and discontinued in 1920s, per. Com. Mark Ferraro of Unilever), cocoa tin, intact 'medicine' bottle (no raised lettering, indented on front for paper label), milk tins (circa 1919-1929 after Simonis) and coblat blue and yellow Fiestaware fragments (1936 or later.) The site appears to date to the 1930s.

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. Resources Present: ____ Building ____ Structure ____ Object _X_ Site ____ District ____ Element of District

P5. Photograph or Drawing (Required for HRI buildings, structures, objects [see box preceeding page].):

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BY:______

Primary #: P 15010236
Trinomial: CA-Ker- 6012
HRI #:
Resource Identifier: Tropico #13

P6. Date Constructed/Age: ___ Prehistoric _X_ Historic ___ Both

P7. Owner and Address: US Government (managed by Ridgecrest Field Office of BLM)

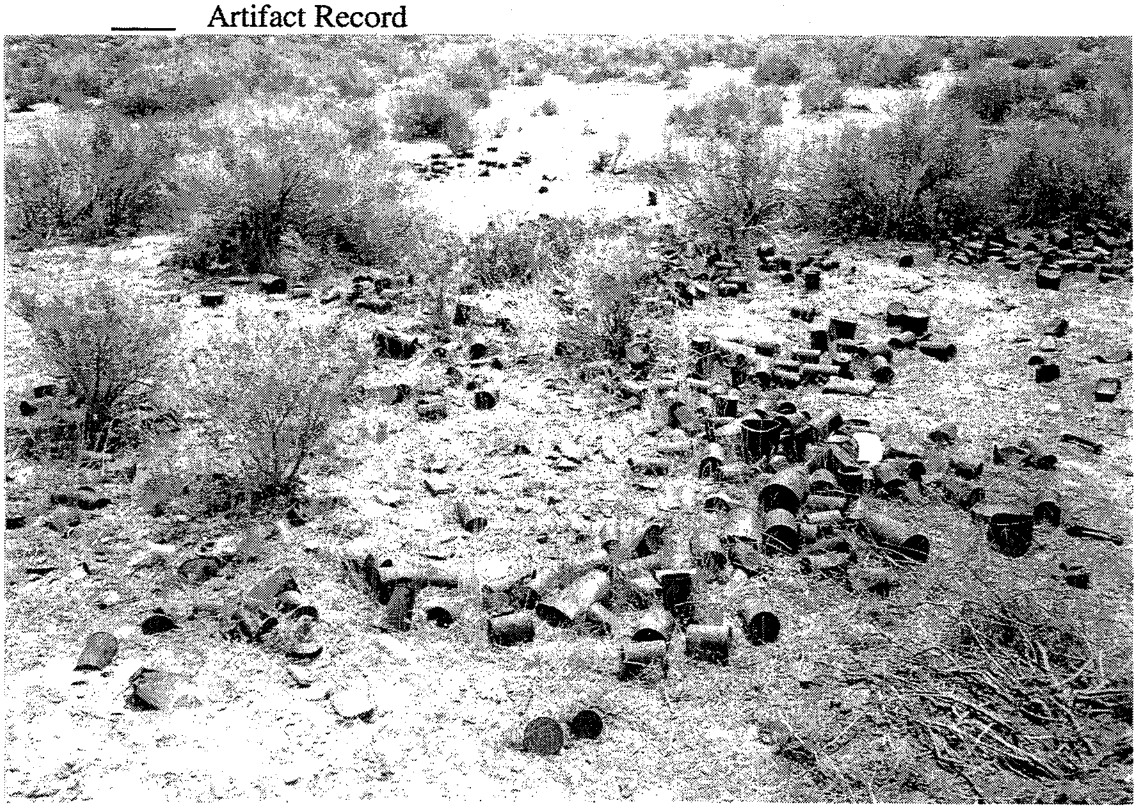
P8. Recorded by: Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. Date recorded: 22 May 2001

P10. Type of Survey: _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ___ Building, Structure, and Object Record
- ___ Linear Resource Record
- ___ District Record
- ___ Illustration Sheet
- ___ Photograph Record
- _√_ Archaeological Site Record
- ___ Archaeological Site Map
- ___ Archaeological Feature Record
- ___ Milling Station Record
- ___ Rock Art Record
- ___ Artifact Record



P 15010236

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6012

A1. Resource Identifier: Tropico #13

A2. Resource Attributes (List attributes and codes.): historic period debris scatter

A3. Dimensions: Length x Width 20' by 50'

Method of measurement: ____ Paced ____ Taped X Visual estimate ____ Other:

Method of determination (Check any that apply.): X Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: X High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None X Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible X Unknown (Explain): extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): debris scatter with 2 loci, see below

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): two concentrations over an area of an estimated 20' by 50' with 110 artifacts. Artifacts include beer with church key opening (1935 or later), key-strip meat tins, sardine tins, vegetable/fruit 'sanitary' tins, clear glass fragments, jar with a screw-top lid, crown caps, coffee tins (1 and 2 pound sizes), round meat tin with key strip (ham?), milk bottle top, hair tonic bottle, Lipton Tea tin (type manufactured starting in 1915 and discontinued in 1920s, per. Com. Mark Ferraro of Unilever), cocoa tin, intact 'medicine' bottle (no raised lettering, indented on front for paper label), milk tins (circa 1919-1929 after Simonis) and coblat blue and yellow Fiestaware fragments (1936 or later.) The site appears to date to the 1930s.

A8. Were Specimens Collected? X No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good X Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2430'

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued
BLM, Barstow Field Office

Trinomial: CA-Ker 6012
Resource Identifier: Tropico #13

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

A13. Historical Information (Note sources and provide full citations below [A15].)**:**

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848) ____ Early American (1848-1880) ____ Turn of Century (1880-1914) X Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain): Milk can typology developed by Simonis indicates these milk cans were manufactured circa 1919-1929. Artifacts include beer with church key opening (1935 or later), Lipton Tea tin (type manufactured starting in 1915 and discontinued in 1920s), cobalt blue and yellow Fiesta ware fragments (1936 or later.) The site appears to date to the 1930s.

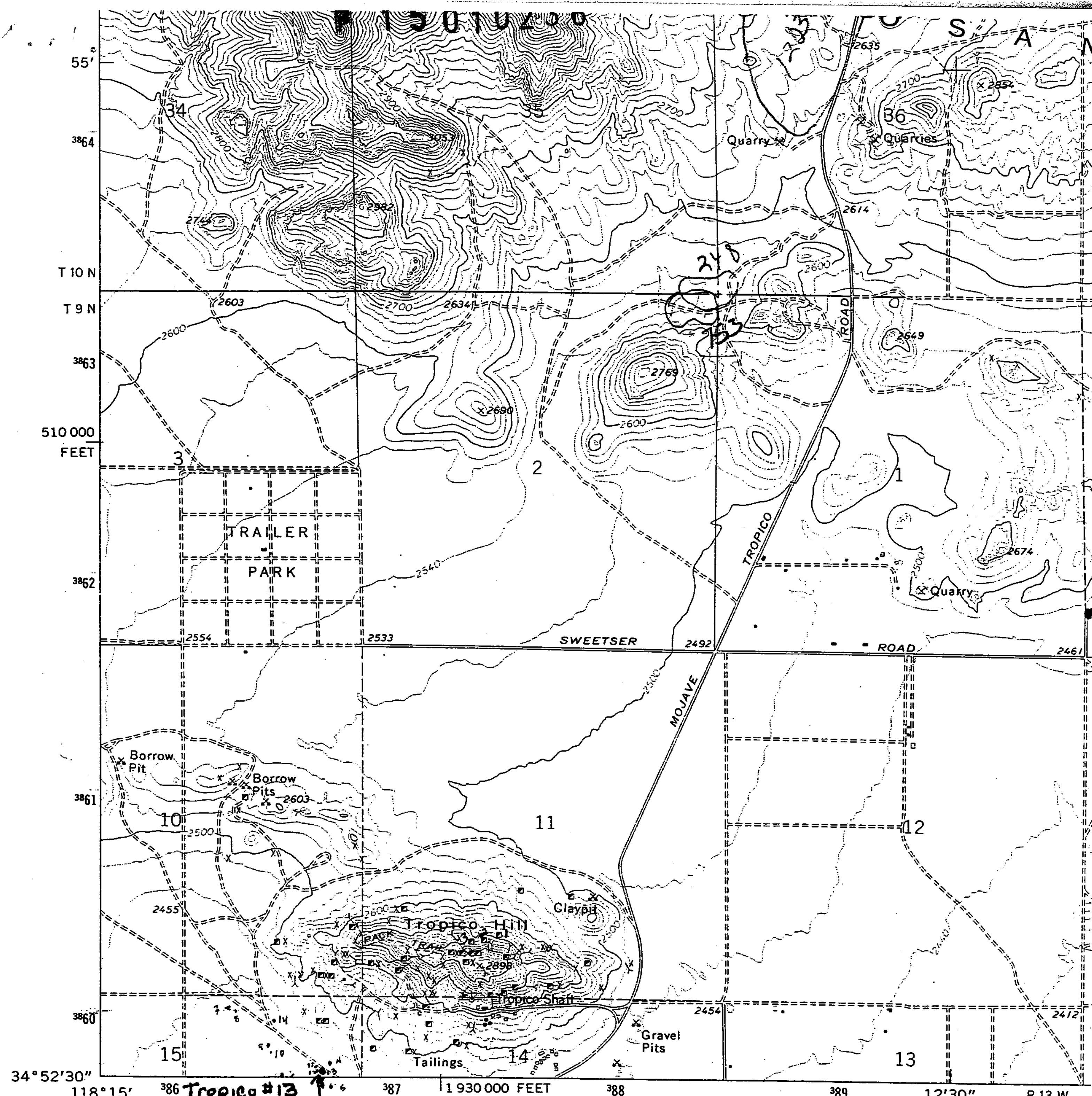
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.)**:** not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.)**:**

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.)**:**

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



TLE BUTTES)
2353 IV SE

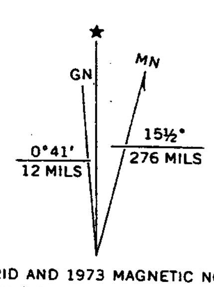
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)
1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area
Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

FOR SALE

PRIMARY RECORD

Bureau of Land Management
Barstow Resource Area
2601 Barstow Road
Barstow, CA 92311

Primary #: P 15010237
Trinomial: CA-Ker-6013
HRI #:
NRHP Status Code:

 Review Code _____ Reviewer __________ Date

P1. **Resource Identifier:** Tropico #14

P2. **Location** (Address and/or UTM coordinates. Attach location map as required).
a. **County:** Kern
b. **Address:**
City:
Zip:
Parcel #:
c. **UTM:** Zone 11: 386513 **mE/** 3859949 **mN**
USGS Quad: Soledad Mtn 7.5' **dated** 1973 **photorevised**
Twp 9N **Rng** 13W **SBBM** SW 1/4 NW 1/4 NE 1/4 NE 1/4 **Section** 15
Elevation: 2430'
d. **Other Locational Data** (e.g. legal description, directions to resource, and other locational information as appropriate):

P3. **Description** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.): 10' by 30' debris scatter with barrel bands, fruit.vegetable tins, milk tins 3 14/16" high by 2 15/16" wide and coffee tins

Environmental Context for Isolates (P3a):
Nearest water: Rosamond
Vegetation: Creosote Bush Scrub
Landform: plain
Geology: alluvium
Exposure/Slope: open, flat

P4. **Resources Present:** ____ Building ____ Structure ____ Object _X_ Site
____ District ____ Element of District

P5. **Photograph or Drawing** (Required for HRI buildings, structures, objects [see box preceeding page].):

RECEIVED
JUN 1 1 2001
BY:

P 15010237

Trinomial: CA-Ker- 6013
HRI #:
Resource Identifier: Tropico #14

P6. Date Constructed/Age: ____ Prehistoric _X_ Historic ____ Both

P7. Owner and Address: private

P8. Recorded by: Sarah C. Cunkelman, Barstow Field Office, CA
Project #: Acton Exchange, Phase I

P9. Date recorded: 22 May 2001

P10. Type of Survey: _X_ Intensive ___ Reconnaissance ___ Other (Describe):

P11. Report citation (Provide full citation or enter "none."): Survey and Evaluation Report for Proposed Phase I land Exchange Near Tropico Mine, May 2001

Attachments:
- _√_ Location Map (7.5' USGS quadrangle)
- ____ Building, Structure, and Object Record
- ____ Linear Resource Record
- ____ District Record
- ____ Illustration Sheet
- ____ Photograph Record
- _√_ Archaeological Site Record
- ____ Archaeological Site Map
- ____ Archaeological Feature Record
- ____ Milling Station Record
- ____ Rock Art Record
- ____ Artifact Record
- ____ Other (list):

Ph

P 15010237

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2)

BLM Barstow Field Office
2600 Barstow Road
Barstow, CA 92311

Trinomial: CA-Ker- 6013

A1. Resource Identifier: Tropico #14

A2. Resource Attributes (List attributes and codes.)**:** historic period debris scatter

A3. Dimensions: Length x Width 10' by 30'

Method of measurement: ____ Paced ____ Taped _X_ Visual estimate ____ Other:

Method of determination (Check any that apply.): _X_ Artifacts ____ Features ____ Soil ____ Vegetation ____ Topography ____ Cut bank ____ Animal burrow ____ Excavation ____ Property boundary ____ Other (Explain):

Reliability of determination: _X_ High ____ Low Explain:

Limitations (Check any that apply.): ____ Restricted access ____ Paved/built over ____ Disturbances ____ Site limits incompletely defined ____ Other (explain):

A4. Depth: ____ None _X_ Unknown Method of Determination:

A5. Human Remains: ____ Present ____ Absent ____ Possible _X_ Unknown (Explain):extremely unlikely

A6. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.)**:** debris scatter

A7. Cultural Constituents (Describe and quantify artifacts, human-introduced organic residues, and other materials not associated with features.): 10' by 30' debris scatter with barrel bands, fruit/vegetable 'sanitary tins, milk tins 3 14/16" high by 2 15/16" wide and coffee tins (2)

A8. Were Specimens Collected? _X_ No ____ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

A9. Site Condition: ____ Good _X_ Fair ____ Poor (Describe disturbances): disturbed by sheep grazing

A10. Nearest Water (Type, distance, and direction): Rosamond (town) approximately 4 miles to east

A11. Elevation: 2430'

A12. Environmental Setting:
Vegetation: (Site and surrounding.) Creosote Bush scrub
Soil (Site and surrounding.)**:** sandy alluvium
Landform: plain
Geology:
Exposure/Slope: open, level
Other associations: within 1 mile of the Tropico Gold Mine

ARCHAEOLOGICAL SITE RECORD (PARTS 1 AND 2) - continued

BLM, Barstow Field Office

Trinomial: CA-Ker 6013
Resource Identifier: Tropico #14

A13. Historical Information (Note sources and provide full citations below [A15].):

A14. Age: ____ Prehistoric ____ Pre-Colonial (1500-1769) ____ Spanish/Mexican (1769-1848)
____ Early American (1848-1880) ____ Turn of Century (1880-1914) X Early 20th Century (1914-1945) ____ Post WWII (1945+) ____ Undetermined

Factual or estimated dates of occupation (Explain): Milk can typology developed by Simonis indicates these milk cans were manufactured circa 1917-1929. The site appears to date to the 1930s.

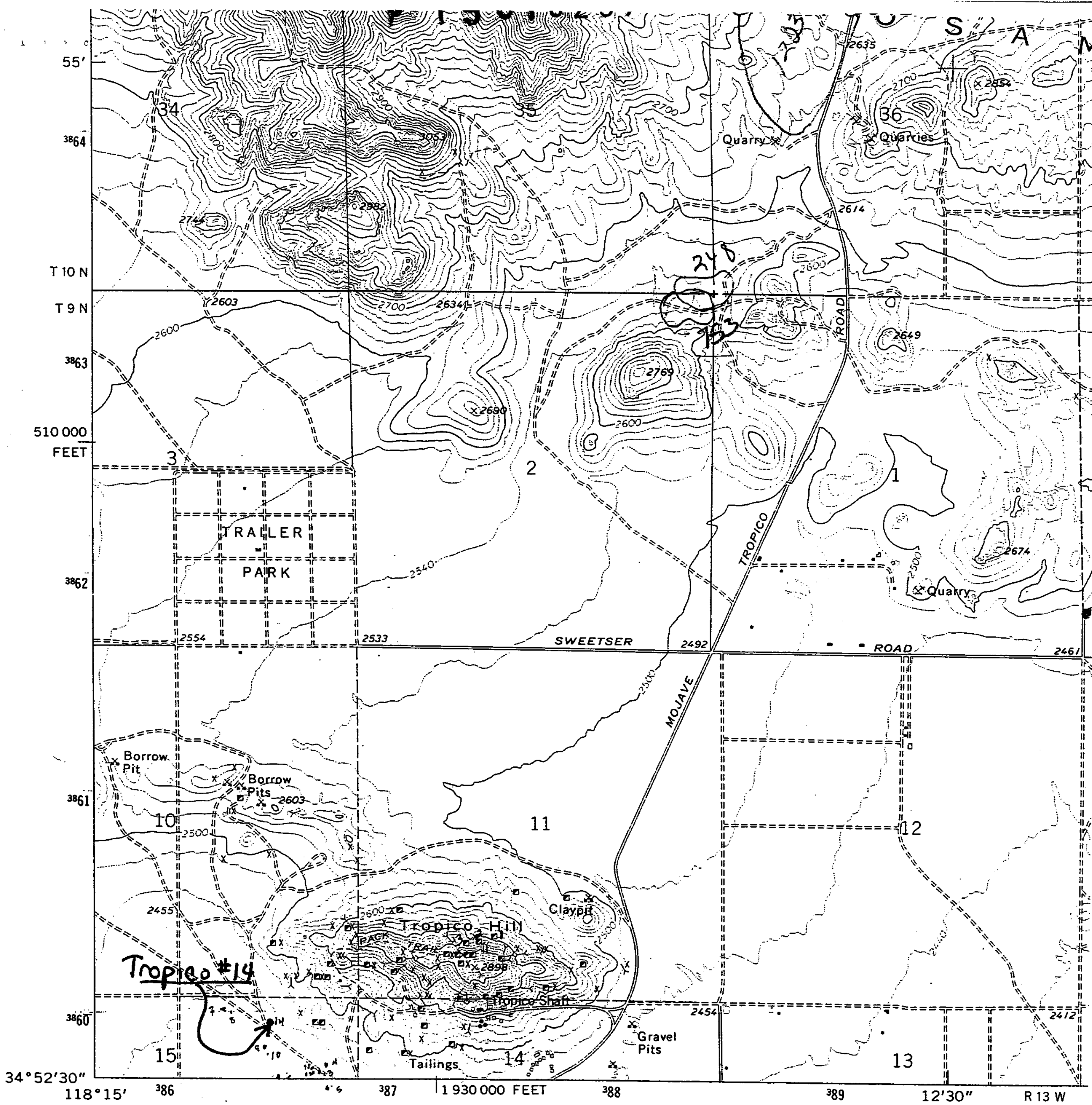
A15. Remarks and Interpretations (Discuss scientific, interpretive, ethnic, and other values of site, if known.): not eligibile

A16. References (Give full citations including names and addresses of any persons interviewed, if possible.):

A17. Photographs (List subject, direction of view, and accession numbers or attach a Photograph Record.):

A18. Form Prepared By: Sarah C. Cunkelman **Date:** 22 May 2001

Affiliation and address: Bureau of Land Management, Barstow Field Office, 2600 Barstow Road, Barstow, CA 92311



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1972. Field checked 1973

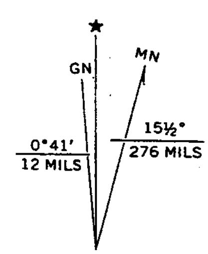
Supersedes Army Map Service map dated 1947

Projection and 10,000-foot grid ticks: California coordinate system, zone 5 (Lambert conformal conic)

1000-metre Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum

A portion of the southeast quarter of this map lies within a subsidence area

Vertical control based on latest available adjustment



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

FOR SALE

Center for Archaeological Research
CALIFORNIA STATE UNIVERSITY, BAKERSFIELD
PRIMARY RECORD

Primary # P-15-010955
HRI #
Trinomial CA-KER-6344
NRHP Status Code 7

Other Listings
Review Code Reviewer Date

 *Resource Name or #: (Assigned by recorder) TW-9

P1. Other Identifier: n/a

*P2. Location: ☒ Not for Publication ☐ Unrestricted *a. County: Kern
and (P2b and P2c or P2d. Attach a Location Map as necessary.)

*b. USGS 7.5' Quad: Soledad Mountain Date: 1973T 9N; R 13W ; SW ¼ of SE ¼ of Sec 10 ; M.D.B.M.

c. Address: n/a (1986) City: Zip:

d. UTM: Zone: 11; 386089 mE/ 3860061 mN

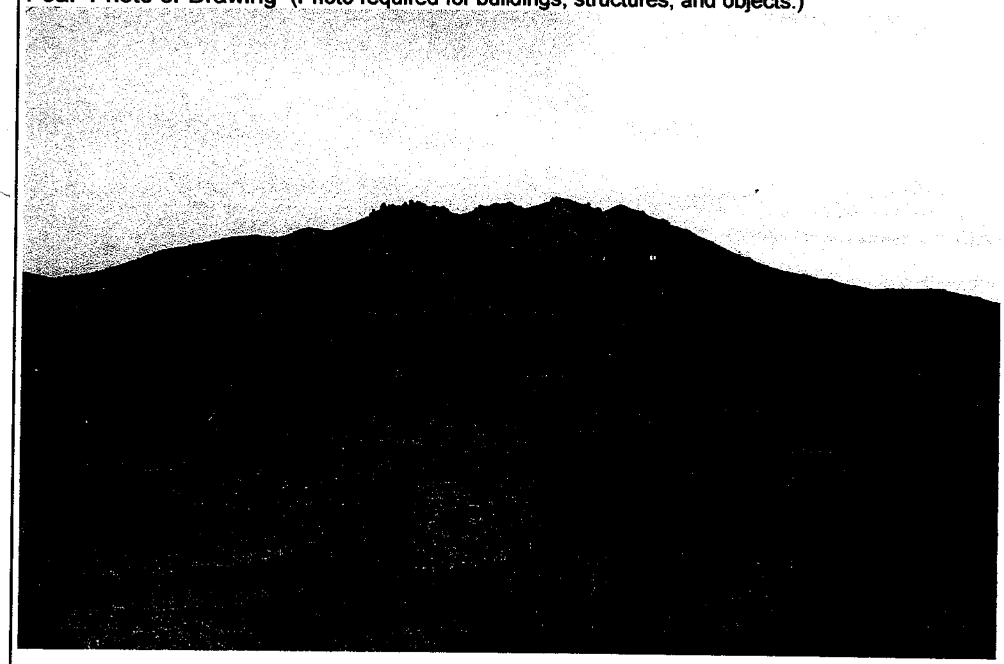
e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate). The site is located between Willow Springs Butte and just west of Tropico Hill at the intersection of two dirt roads. It is approximately 1.25 mi. north of Rosamond Boulevard. It is situated in a flat area, adjacent to the western slope of Tropico Hill.

*P3a. Description: (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries) The site includes 50+ rhyolite flakes. It is located near an area of heavy mining, both historical (post-1894) and modern.

*P3b. Resource Attributes: (List attributes and codes) Lithic Scatter (AP2)

*P4. Resources Present: ☐Building ☐Structure ☐Object ☒Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)



P5b. Description of Photo: (View, date, accession #) Overview of TW-9, view east, photo dated 12/06/03 (Tropico Hill in the background) (Acc. No. CAR-03-16-00-09).

*P6. Date Constructed/Age and Sources: ☐Historic ☒Prehistoric ☐Both

*P7. Owner and Address: private

*P8. Recorded by: (Name, affiliation, and address) Hubert Switalski, AMEC Earth and Environmental, Tehachapi; Rebecca Orfila, CAR, 9001 Stockdale Hwy, Bakersfield.

*P9. Date Recorded: July 2003

*P10. Survey Type: (Describe) intensive

*P11. Report Citation: (Cite survey report and other sources, or enter "none.") Phase I Archaeological Assessment of the Tehachapi Wind Power Transmission System Project for Southern California Edison, Kern and Los Angeles Counties, California

*Attachments: ☐NONE ☒Location Map ☒Sketch Map ☐Continuation Sheet ☐Building, Structure, and Object Record ☒Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (List):

***A1. Dimensions: a. Length:** 50 (m.) × **b. Width:** 30 (m.)

Method of Measurement: ☒ Paced ☐ Taped ☐ Visual estimate ☐ Other:

Method of Determination (Check any that apply.): ☒ Artifacts ☐ Features ☐ Soil ☐ Vegetation ☐ Topography ☐ Cut bank ☐ Animal burrow ☐ Excavation ☐ Property boundary ☐ Other (Explain):

Reliability of Determination: ☐ High ☐ Medium ☐ Low Explain:

Limitations (Check any that apply): ☐ Restricted access ☐ Paved/built over ☐ Site limits incompletely defined ☐ Disturbances ☐ Vegetation ☒ Other (Explain): In 1984, Crandall Hill (Tropico Hill) was purchased by Ezra Hamilton, and the search for gold in Antelope Valley began. There is a possibility that the flakes found west of Tropico Hill could be a by-product of mining in the area during the late 1800s and early 1900s. However, most of the debitage observed possessed diagnostic characteristics of flaked stone, suggesting that the area may have been utilized for lithic procurement during the prehistory of the area.

A2. Depth: ☐ None ☒ Unknown Method of Determination:

***A3. Human Remains:** ☐ Present ☐ Absent ☐ Possible ☒ Unknown (Explain):

***A4. Features** (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.): none

***A5. Cultural Constituents** (Describe and quantify artifacts, ecofacts, cultural residues, etc., not associated with features.): 50+ rhyolite flakes

***A6. Were Specimens Collected?** ☐ No ☒ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)

***A7. Site Condition:** ☐ Good ☒ Fair ☐ Poor:

***A8. Nearest Water** (Type, distance, and direction.): nothing nearby

***A9. Elevation:** ca. 2,500 ft.

A10. Environmental Setting (Describe culturally relevant variables such as vegetation, fauna, soils, geology, landform, slope, aspect, exposure, etc.): creosote environment

A11. Historical Information: See A1 limitations.

***A12. Age:** ☒ Prehistoric ☐ Protohistoric ☐ 1542-1769 ☐ 1769-1848 ☐ 1848-1880 ☐ 1880-1914 ☐ 1914-1945 ☐ Post 1945 ☐ Undetermined **Describe position in regional prehistoric chronology or factual historic dates if known:**

A13. Interpretations (Discuss data potential, function[s], ethnic affiliation, and other interpretations): See A1 limitations

A14. Remarks: none

A15. References (Documents, informants, maps, and other references): none

A16. Photographs (List subjects, direction of view, and accession numbers or attach a Photograph Record.): See Photograph Record.

Original Media/Negatives Kept at: CSUB, CAR

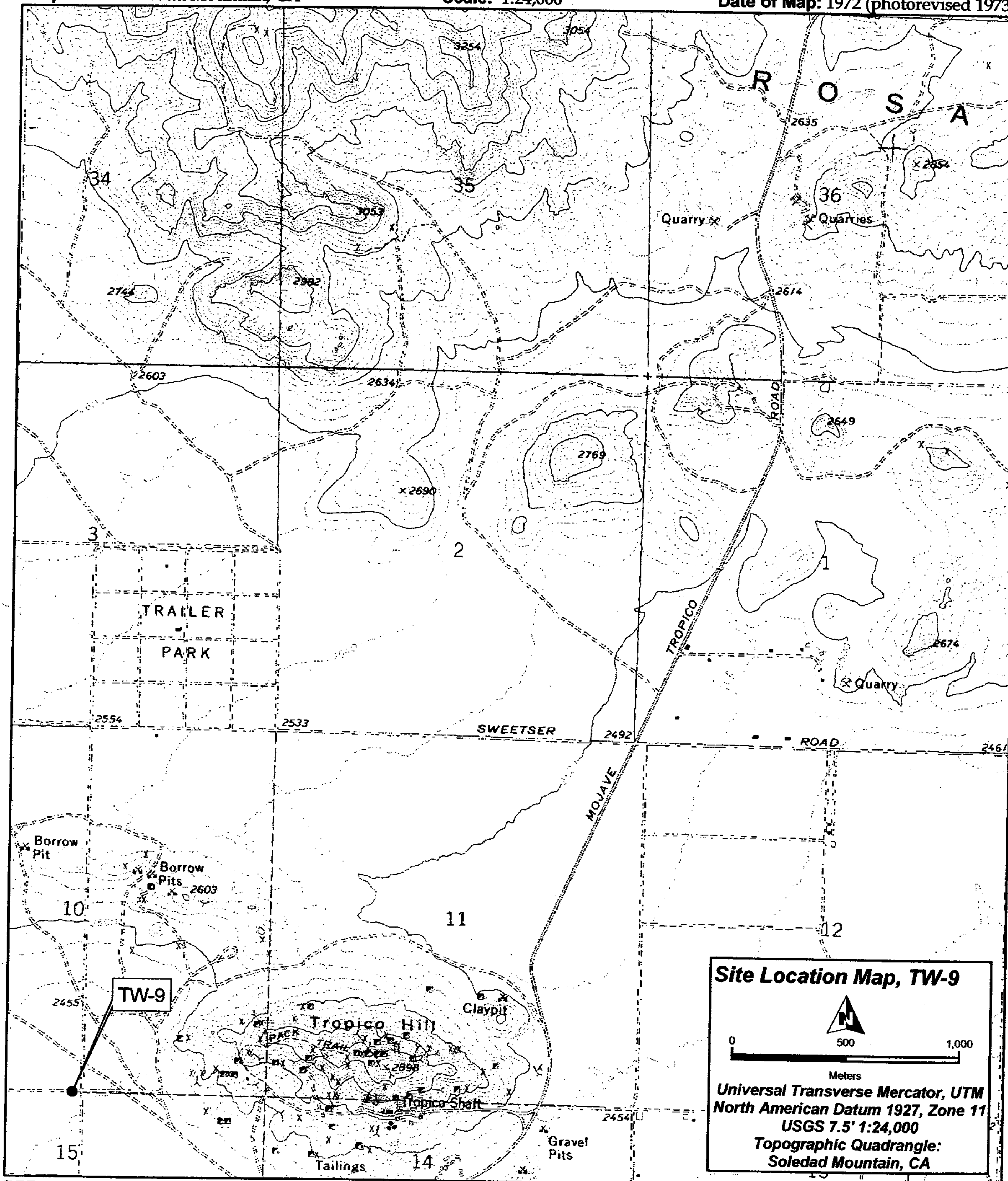
***A17. Form Prepared by:** Audry Williams **Date:** 12/22/03
Affiliation and Address: Center for Archaeological Research, CSU Bakersfield, 9001 Stockdale Hwy., Bakersfield, CA 93311

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary # P-15-010955
HRI#
Trinomial CA-KER-6344

***Resource Name or #:** TW-9

***Map Name:** Soledad Mountain, CA ***Scale:** 1:24,000 ***Date of Map:** 1972 (photorevised 1973)



*Required information

P-15-011586

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

DO NOT WRITE IN THIS BLOCK:
Reg. No. KER-011
Date 2-9-96
By S.IE

POINT OF HISTORICAL INTEREST

COUNTY KERN | NAME WILLOW SPRINGS INTERNATIONAL RACEWAY

COMPLETE ADDRESS 3500 75th STREET WEST ROSAMOND, CA. 93560

Historical Significance (summary paragraph only):

Willow Springs International Raceway is indeed the oldest, purpose-built road-racing facility in the United States.

SOUTHERN SAN JOAQUIN VALLEY
ARCHAEOLOGICAL INFORMATION CENTER
CAL STATE UNIVERSITY, BAKERSFIELD
9001 STOCKDALE HIGHWAY
BAKERSFIELD, CA 93311-1099

RECEIVED
JUN 01 2005
BY:

Assessor's Parcel Number: 252-050-09-00-9

THIS POINT OF HISTORICAL INTEREST IS NOT A CALIFORNIA REGISTERED HISTORICAL LANDMARK

RECOMMENDED:

SIGNATURE OF CHIEF ELECTED GOVERNMENT OFFICIAL

NAME OF MUNICIPAL AGENCY

Date:

OR

RECOMMENDED:

Kenneth W. Peter

SIGNATURE OF CHAIRPERSON, COUNTY BOARD OF SUPERVISORS

Date: MAR 14 1995

RECOMMENDED:

SIGNATURE OF CHAIRPERSON, STATE HISTORICAL RESOURCES COMMISSION

Date: 2 Feb 1996

AND

APPROVED:

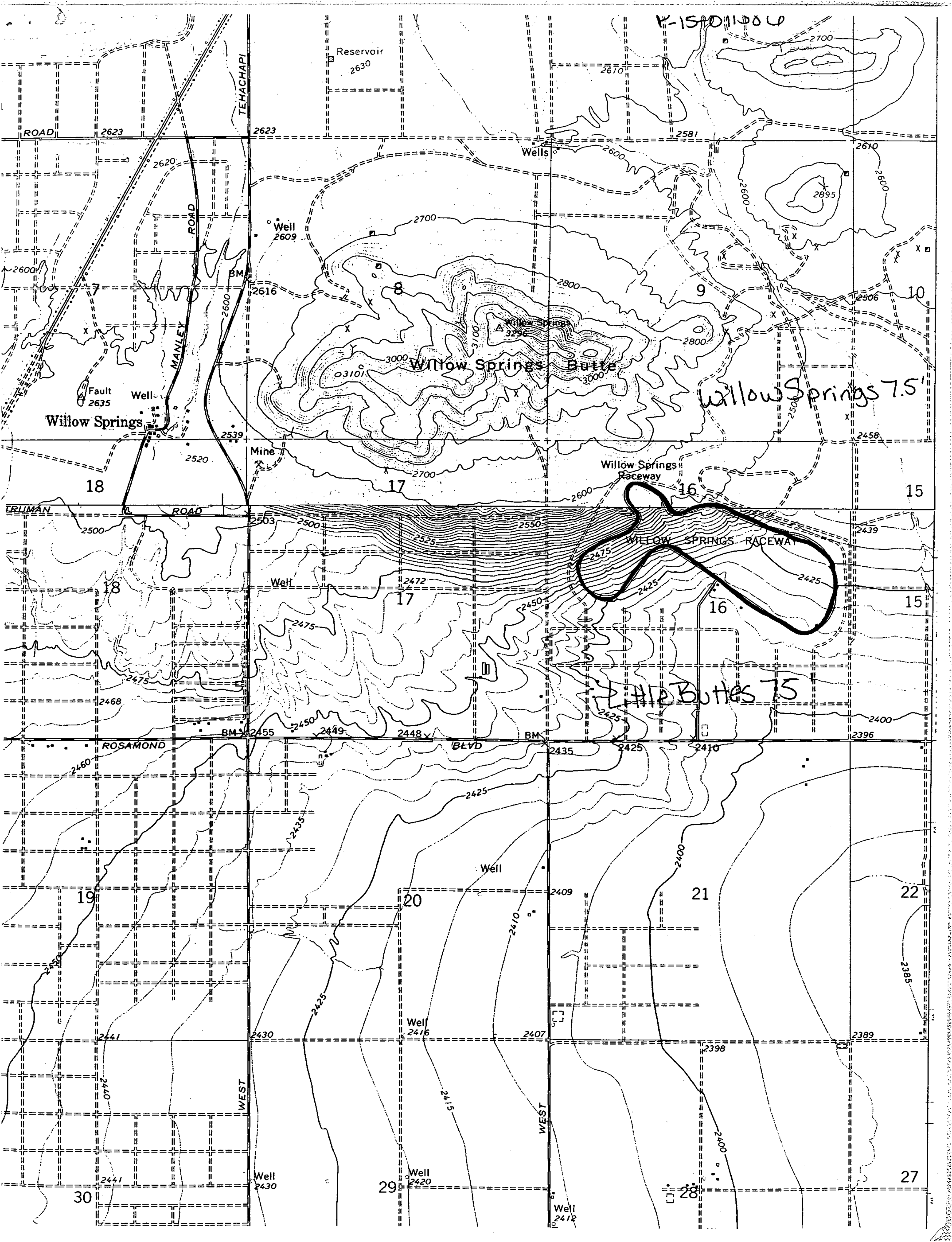
Donald W. Murphy

SIGNATURE OF DIRECTOR, CALIFORNIA DEPARTMENT OF PARKS AND RECREATION

Date: 2/13/96

PLEASE USE TYPEWRITER. OBTAIN APPROPRIATE SIGNATURES. TRANSMIT AN ORIGINAL TO:

STATE HISTORICAL RESOURCES COMMISSION
DEPARTMENT OF PARKS AND RECREATION
POST OFFICE BOX 942896
SACRAMENTO, CA 94296-0001



Reservoir
Wells
Well
Willow Springs Butte
Willow Springs
3296
Fault
2635
Willow Springs
Mine
Willow Springs Raceway
WILLOW SPRINGS RACEWAY
Willow Springs 7.5'
Little Buttes 7.5'
ROAD
TEHACHAPI
MANLEY
ROAD
TRUMAN
ROAD
ROSAMOND
BLVD
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